The Lithopone Ridges, Slag Pile Area, and/or UPSEA are the source of these analytes is the TOLA with a contribution from OU2 for ammonia and sulfate.

- Arsenic, barium, iron, manganese, ammonia, and sulfate were consistently detected at concentrations greater than their respective HCOPC screening levels in the BOLA. The extent of arsenic in the BOLA is isolated to the vicinity of W-12(D) in the Bluff Area. The extent of iron is delineated to the west, but not to the east. The extent of manganese is not delineated to the east or west. The extent of sulfate is delineated to the west, but not to the east. Cadmium, nickel, zinc, fluoride, and nitrate/nitrite are not present in the BOLA at concentrations greater than HCOPC screening levels. Barium at MW-20B in the BOLA is present at concentrations greater than the HCOPC screening level and is not delineated to the west. The extent of barium is delineated to the south and east and does not extend to DePue Lake at concentrations greater than the HCOPC screening level. The downgradient extents of iron, manganese, and sulfate were not delineated to the south in the BOLA prior to reaching DePue Lake. Therefore, they have been defined in OU5.

Response (to 84g continued from above)

- The Lower Aquifer does not extend to the south side of DePue Lake; consequently, Lower Aquifer ground water is discharging to the springs, seeps, wetlands and by other means in the area of the wetlands fringing the lake, and through the lake.

***Illinois EPA Review**: As indicated previously, if the intention is to use the proposed OU2 report conclusion (i.e., discharge to stream channel, springs, seeps and wetland soils), it should be acknowledged in the OU3 report revision that this is still under investigation.*

Review Response: See response to comment 83d.

Response (to 84g continued from above)

- It is possible that iron and manganese detected in the Lower Aquifer in the Bluff Area and areas west and east of the Lithopone Ridges Area and Slag Pile Area may represent ambient conditions in the Lower Aquifer.

***Illinois EPA Review**: Refer to earlier reviews of response to comments regarding the presence of iron and manganese in groundwater as being indicative of ambient conditions as inaccurate (e.g., 65, 68, 82).*

Review Response: See response to Comment 68a and Comment 82.

***Comment 84 i)** Based on the data the IRM walls have limited ability to effectively treat groundwater. The geochemical or physical mechanism causing the decrease in concentrations along the investigation transects has not been explained. The extents of the IRM walls were not verified. Capture of groundwater that passively flows into the Center and South IRM Wall underdrains, along with some surface water control provided by the interceptor system appears to be the major contribution of the system. These conclusions should be included in the summary.*

Response: The text will be edited as follows:

- "The extents of the Center and South IRM Walls could not be verified during the Phase II RI; however, the IRM Wall/Interceptor trench system appears to be effective in reducing the concentrations of COPCs downgradient of the IRM Walls, particularly along Transect 2."

***Illinois EPA Review**: The mechanisms responsible for the observed changes in analyte concentrations have not been definitively identified or proven; consequently, the effectiveness of the IRM system cannot be definitively determined. A distinction should be made between the effectiveness of capture (relatively effective where it occurs) and the effectiveness of the IRM material (little to no proven effect) to reduce metals concentrations.*

Review Response: IEPA's review response for comment 42f(2) above indicates that a definitive identification of the mechanisms responsible for the observed changes in analyte concentrations across the IRM walls is not required. As outlined in review response 42e, pH-driven precipitation or adsorption reactions, iron- and sulfate-reduction, and potential metal-sulfide or metal-iron-sulfur mineral precipitation may all play a role in the observed changes in groundwater chemistry across the IRM Wall/shallow Interceptor system. Identification of the exact mechanisms and the percent contribution of each mechanism to the observed changes would only be possible with detailed geochemical/mineralogical studies and still may not yield a definitive answer. Furthermore, the analytical results along the transects are similar prior to and after shutdown of the underdrains, indicating that treatment occurred across the Center and South IRM Walls while the underdrains were closed. Based on the data collected during the IRM Wall investigation, additional text will be added to the response above to read:

- "The extents of the Center and South IRM Walls could not be verified during the Phase II RI; however, the IRM Wall/Interceptor trench system appears to be effective in reducing the concentrations of COPCs downgradient of the IRM Walls, particularly along Transect 2. The interceptor trenches and underdrains are effective in removing COPCs through the capture and ex-situ treatment of groundwater. In addition to the influence of the interceptor trenches and underdrains, the Center and South IRM walls appear to also be effective at reducing COPC concentrations, based on the similar concentrations observed before and after trench shutdown and the differences in COPC concentrations upgradient and downgradient of the walls."

***Comment 84 k)** The summary should include a bullet discussing the volume of flow that is captured vs. not captured.*

Response: The following text will be added to the summary:

- The estimated percentage of groundwater flux across the southern property boundary between HS-03(S) and TW-5S that is captured by the IRM Wall/Interceptor Trench System during baseline conditions on November 15, 2010 and September 14, 2010, the inflow to the IWTP on these dates was approximately 86% on November 15, 2010 and 56% on September 14, 2010.
- The estimated percentage of groundwater flux across the southern property boundary along the entire east-west length of the Slag Pile from PZ-04(S)R to PZ-03(S) that is captured by the IRM Wall/Interceptor Trench System during baseline conditions on November 15, 2010 and September 14, 2010 was approximately 25% on November 15, 2010 and 16% on September 14, 2020.

***Illinois EPA Review**: Revisit the text, tables, and responses to comments to get the correct year for the September 14 date. It has been listed as 2010 and 2011 in the text, as 2011 on Table 4-16, and 2020 in this response to comment and for comment 41*

Review Response: Please see response to comment 41.

***Comment 84 l)** Evidence should be provided to support the conclusion that iron and manganese in the Lower Aquifer is due to reducing conditions or contributions from coal bedrock. The table below shows concentrations in TOLA wells collected in April 2009. Using MW-32T as a suitable* *background well, it appears that iron, manganese, and sulfate are introduced to the Lower Aquifer despite only mildly reducing conditions and no pyrite bearing coal bedrock. The Lithopone Area is a contributor of these contaminants to the Lower Aquifer.*

Apr-09

TOLA Well	Area	Fe (ug/L)	Mn (ug/L)	Sulfate (mg/L)	ORP (mV)	DO (mg/L)	pH (SU)
MW-32T	Bluff	3,590	161	220	-94	1.69	6.61
MW-30T	Lithopone	6,340	6,670	550	201	1.84	6.41
HH-09	Eastern	91,800	16,800	2,400	34	1.14	6.41

Response: The reference to contributions from coal will be removed from the text.

***Illinois EPA Review**: The response is partially adequate. No evidence has been presented that reducing conditions exist at the downgradient edge of the UPSEA. The presence of iron, manganese, and sulfate in the Lower Aquifer here is the result of migration from OU2 and contributions from the Lithopone Ridge Area.*

Review Response: The tables below show the concentrations of iron, manganese, and sulfate as well as the associated field measured parameters of oxidation-reduction potential (ORP), dissolved oxygen (DO), and pH for the four quarters of monitoring at the wells identified above and including TOLA HH-08R located in the Lithopone Ridges Area and between MW-23T and MW-30T. As shown in the tables, the background concentration of iron at MW-32T ranged from 2,520 ug/L to 18,900 ug/L during the quarterly sampling. The range of iron detections at HH-08R and MW-30T are within this background range. The DO and ORP of the Lower Aquifer is variable, but generally low, consistent with reducing conditions. The higher dissolved iron detected at HH-09 could be a result of generally lower pH observed at that location. In addition, lower concentrations of iron were detected in the UWBZ in the Lithopone Ridges Area than the concentrations measured in the Lower Aquifer, which also indicates that the Lithopone Ridges Area does not appear to be the source of iron in the Lower Aquifer.

Elevated concentrations of manganese and sulfate are present in the UWBZ in the Lithopone Ridges Area and the results of leachate testing summarized in Table 4-6 of the Preliminary Phase II RI Report indicate that the fill material, peat, and silty clay materials that comprise the aquitard can leach manganese greater than the HCOPC screening level. The presence of these analytes in the Lower Aquifer greater than the HCOPC screening level may be a result of a combination of contributions from the Lithopone Ridges Area as well as reducing conditions as shown by the generally low DO and ORP in the Lower Aquifer.

TOLA Well	Area	August and November 2007					
		Fe (ug/L)	Mn (ug/L)	Sulfate (mg/L)	ORP (mV)	DO (mg/L)	pH (SU)
MW-32T	Bluff	18,900	342	462	-188	0	6.41
HH-08R	Lithopone	5,080	977	0.225 J	-112	0	7.2
MW-30T	Lithopone	4,850	13,500	796	-37	0	6.36
HH-09	Eastern	71,300	16,300	1,870	-40	0	6

TOLA Well	Area	June-July 2008					
		Fe (ug/L)	Mn (ug/L)	Sulfate (mg/L)	ORP (mV)	DO (mg/L)	pH (SU)
MW-32T	Bluff	3,610	123	46	-83	0	6.91
HH-08R	Lithopone	5,850	1,060	28.1J	-136	0	6.59
MW-30T	Lithopone	7,380	7,910	583	24	0.3	5.74
HH-09	Eastern	111,000	21,000	2,460	66	4	6

TOLA Well	Area	January 2009					
		Fe (ug/L)	Mn (ug/L)	Sulfate (mg/L)	ORP (mV)	DO (mg/L)	pH (SU)
MW-32T	Bluff	2,520	115	38	-142	0	6.78
HH-08R	Lithopone	6,060	798	51J	-140	0	9.55
MW-30T	Lithopone	7,480	7,320	650	6	1.95	6.36
HH-09	Eastern	110,000	17,800	2,700	83	0	6

TOLA Well	Area	April 2009					
		Fe (ug/L)	Mn (ug/L)	Sulfate (mg/L)	ORP (mV)	DO (mg/L)	pH (SU)
MW-32T	Bluff	3,590	161	220	-94	1.69	6.61
HH-08R	Lithopone	7,140	780	58	140	2.2	7.06
MW-30T	Lithopone	6,340	6,670	550	201	1.84	6.41
HH-09	Eastern	91,800	16,800	2,400	34	1.14	6.14

Off-Site Groundwater Investigation
Comment 84 m) *Iron, ammonia, and sulfate occasionally exceed the HCOPC screening levels in the Lower Aquifer west of the UPSEA.*

Response: Iron, ammonia, and sulfate were detected at concentrations greater than their respective HCOPC screening levels at MW-48B during one of four sampling events (November 16, 2010). A comparison of the November 16, 2010 data to the other three quarters of data indicates that the laboratory results from the November 16, 2010 sampling event are anomalous and are not indicative of groundwater conditions at MW-48B.

Illinois EPA Review: *As stated in previews reviews to response to comments, if there is a reason other than "appearing" anomalous (i.e., laboratory issue), the revised text should identify that as well.*

Review Response: The results from November 16, 2010 appear anomalous as compared to the results from the three other sampling events. No text changes are proposed.

Comment 84 n) *At the downgradient edge of the UPSEA, zinc and nickel concentrations are elevated in MW-27T and W-18(D), although neither exceeds their respective screening levels. Iron, manganese, and sulfate in the Lower Aquifer may also be contributed by the FPSA, particularly the Lithopone Ridge Area (see well HH-09).*

Response: Noted

***Illinois EPA Review**: The response is unacceptable. The bullet should acknowledge the contribution of the FPSA and Lithopone Ridge Area and potentially other metals.*

Review Response: See response to comment 82 and 84i. The second bullet under the Off-Site Groundwater Investigation section will be edited as follows:

- The extent of COPCs has been delineated south of the FPSA. Based on the groundwater sampling results, manganese is the only COPC consistently detected in the Lower Aquifer greater than the HCOPC screening level west of the UPSEA. Iron, ammonia, and sulfate were detected at concentrations greater than their respective HCOPC screening levels at MW-48B during one of four sampling events (November 16, 2010). A comparison of the November 16, 2010 data to the other three quarters of data indicates that the laboratory results from the November 16, 2010 sampling event are anomalous and are not indicative of groundwater conditions at MW-48B. At the downgradient edge of the UPSEA, iron, manganese, ammonia, and sulfate are present greater than HCOPC screening levels and elevated concentrations of zinc and nickel are present at MW-27T and W-18(D). Iron, manganese, ammonia, and sulfate are present in the Lower Aquifer greater than HCOPC screening levels east of the UPSEA. The waste materials present in OU2 and the FPSA contain some COPCs that are common to both operable units. These common COPCs include, but may not be limited to, sulfate, fluoride, arsenic, iron, and manganese in the eastern portion of the FPSA, in the off-site area to the east, and UPSEA.

***Comment 84 q)** The metals concentrations detected in shoreline seeps SP-03 through SP-7 more closely resemble those detected in the UWBZ rather than those detected in the Lower Aquifer.*

Response: Noted. However, the UWBZ is not present within the Village of DePue and upgradient of the shoreline. Therefore, the UWBZ cannot be the source for shoreline seeps SP-03 through SP-07.

***Illinois EPA Review**: See reviews of previous response to comments regarding source of seeps (e.g., 57, 76, 83). These responses also state the possible off-site locations where site-related materials could be present, resulting in the presence of FPSA metals (e.g., cadmium, zinc) in the seep samples. The revised text needs to specifically state this as a probable source.*

Review Response: The response was presented to address IEPA's comment regarding the concentrations detected in the shoreline seeps SP-03 through SP-07 resembling the UWBZ. In response to the Illinois EPA Review, the conclusion text will be revised to read:

- Based on the groundwater results and the bi-weekly seep monitoring, and the lack of UWBZ upgradient of DePue Lake, the Lower Aquifer is the source of the shoreline seeps SP-1 through SP-10. Concentrations of metals detected in the shoreline seeps at SP-04 through SP-08 may also be influenced by the proximity to the Division Street Drain area or from material placed on the lake shore. Metals detected at the remaining locations may also be influenced from the placement of non-native materials including concrete, brick, potential plant-related material, tires, abandoned equipment, and general trash on the shoreline.

***Comment 84 s)** With the exception of MW-48T/B, the vertical gradient within the Lower Aquifer in downward. At MW-48T/B it is suggested that the Lower Aquifer has some hydraulic connection with the abandoned former intake structure.*

Response: Comment noted

***Illinois EPA Review**: The revised text should address the effect of the abandoned former intake structure.*

Review Response: The following text has been added to the summary of vertical gradients: "The downward vertical gradient observed at MW-48T/B may be a result of the influence of the abandoned former intake structure."

Geochemical Investigation

Comment 84 u) *It is uncertain if the non-native material in the UPSEA is acid producing. The native material in the UPSEA is acid producing. The native material in Eastern Area is acid producing. Non-native waste material in the Lithopone Area was not tested.*

Response: The following text will be added to the discussion of the Geochemical Investigation:

- The non-native material in the Slag Pile Area is acid producing. The non-native material in the Lithopone Ridges Area is not acid producing and it is uncertain if the non-native materials in the UPSEA are acid producing. An evaluation of the acid production potential of the Eastern Area was not performed during the Phase II RI, but based on paste pH data obtained during the Phase I RI, the non-native and native materials in the Eastern Area are generally not acid producing.
- The native materials in the Lithopone Ridges Area and the Slag Pile Area are not acid producing. The native peat in the Eastern Area and at SB-19 in the UPSEA could produce acid.

Illinois EPA Review: *It is uncertain whether non-native material in the Lithopone Ridge Area is acid producing because a proper sample (one containing less cover fill material) was not tested. The first bullet above should be revised.*

Review Response: See review response 24 above. Non-native materials sampling during the Phase I RI indicate that the non-native materials in the Lithopone Ridges Area are not acid producing. The text will be edited to read:

- The non-native material in the Slag Pile Area and some of the non-native material in the Eastern Area could produce acid. Depending on the net neutralization potential, it is uncertain if the non-native material in the UPSEA is acid producing; however, the acid-base potential analysis performed during the Phase I RI indicates that the non-native material in the UPSEA is not acid producing. The non-native material in the Lithopone Ridges Area is not acid producing.

Comment 84 v) *The effectiveness of sequestration capabilities varies with location and types of native material. Some native materials may leach instead of sequestering metals. Some locations the native peat/aquitard is absent or significantly thinned. The generalized conclusion provided here doesn't adequately summarize the findings.*

		Acid Generating?			Sequestration ?				
		NPP	NAG	Paste	SRB	TOC	CEC	AVS	Comment
Lithopone Area	Non-Native	Uncertain	Uncertain	Uncertain	Low	Low	Low	ND	*Samples from sandy clay cover*
	Native	N	?	N	Low	Low	Low	ND	Peat, AQTD, and AQ
Eastern Area	Non-Native	?	?	?	?	?	?	?	No samples collected
	Native	N (YES)	?	N	Low	Med	High	Low	Seq and acid from peat
Slag Pile Area	Non-Native	N	YES	YES	Low	Low	Low	Low	
	Native	N	N	N	Low	Low	Med	Low	Seq from peat
UPSEA	Non-Native	Uncertain	N	N	Low	Low	Low	Low	
	Native	N (YES)	?	N	Low	Low	High	Low	Seq and acid from peat

Response: The findings will be updated as outlined in Response to Comment 31.

***Illinois EPA Review**: See further comments on responses to Comment 31.*

Review Response: See response to Illinois EPA Review for Comment 31. The following will be incorporated into the text:

- The results of the sequential batch testing indicate that the UWBZ, the Lower Aquifer, and the Aquitard material (Peat and Silty Clay) in general are sequestering metals (see Table 4-5B), resulting in decreased metals concentrations in the Lower Aquifer groundwater as compared to the metals concentrations in the UWBZ groundwater. The apparent sequestration exhibited by the Lower Aquifer material sands during the sequential batch test may be due to adsorption to iron and manganese oxides formed during the experiment. In general, the Aquitard material (Peat 1 and Silty Clay 1) in the Slag Pile area exhibits a greater ability to sequester metals than the Aquitard material (Peat 2 and Silty Clay 2) in the Lithopone Ridges Area.

Surface Water and Sediment

***Comment 84 y)** No summary of the surface water and sediment investigation is provided in this section.*

z) Potentially contaminated surface water runoff from the FPSA still has access to the lake via the Division St. drain.

Response: The following text will be added to a Surface Water and Sediment subheading:

- North Ditch surface water samples detected aluminum, arsenic, barium, beryllium, cadmium, cobalt, copper, iron, lead, manganese, nickel, selenium, thallium, zinc, fluoride, sulfate, and ammonia at concentrations greater than ECOPC screening levels. Illinois EPA General Use Water Quality standards are not available for aluminum, beryllium, cadmium, cobalt, copper, lead, manganese, nickel, thallium, zinc, sulfate, and ammonia. The concentration of arsenic, barium, and selenium are less than their respective Illinois General Use Water Quality Standard and the concentration of iron and fluoride are greater than their respective Illinois General Use Water Quality Standard.
- North Ditch sediments contain arsenic, copper, lead, manganese, cadmium, iron, nickel, silver, and zinc at concentrations greater than their respective ECOPC screening level.
- In the settling ponds, barium, copper, cobalt, iron, manganese, ammonia, and fluoride were detected in surface water at concentrations greater than the ECOPC screening level in both ponds. Aluminum, cadmium, lead, and zinc were also detected greater than the ECOPC screening level in settling pond SP-2.
- Iron and manganese were detected in surface water at concentrations greater than the Illinois General Use Water Quality Standards in settling pond SP-1.
- Arsenic, cadmium, copper, lead, manganese, and zinc were detected in the sediment within both settling ponds at concentrations greater than ECOPC screening levels. Chromium iron, mercury, nickel, potassium, and silver were also detected in sediment in settling pond SP-2 at concentrations greater than the ECOPC screening level. These analytes were not tested in settling pond SP-1.
- The surface water sample from seep N004 obtained in July 2009 contained aluminum, barium, cadmium, copper, iron, lead, manganese, zinc, ammonia, and sulfate at concentrations greater than their respective ECOPC screening levels. The concentration of iron is also greater than the general use water quality standard.

- Impacted sediment and surface water from the North Ditch do not migrate off-site; therefore, the primary transport mechanism for surface water and sediment from the North Ditch is migration of COPCs into the groundwater.
- The Division Street Ditch is present west of the Slag Pile area, which discharges to the lake. The Division Street Ditch would only convey surface water during very heavy rain events.

***Illinois EPA Review**: Refer to review of response to comments 54, 55, and 56 regarding surface water and sediment results. Ensure that the text in Section 5 and the summary are consistent and correct. There are some inconsistencies in the responses. The sixth bullet refers to seep N004; this sample should be the surface water and sediment sample collected from the South Ditch (SD-01). There are inconsistencies between the text in Section 5 and the summary text provided in the response; review for consistency and accuracy. As was mentioned for the North Ditch, migration of contaminants in the South Ditch should also be mentioned in the text. The revised report should document the observations that were made during precipitation events that resulted in the statement, "The Division Street Ditch would only convey surface water during very heavy rain events."*

Review Response: The sixth bullet refers to the results for seep N004 obtained in July 2009 and is consistent with the text included in the approved response to comment 56 and an additional discussion of the discharge of the Division Street Ditch has been incorporated into the last bullet. Three additional bullets have been added to summarize the results of the samples obtained in the South Ditch and the migration of surface water and sediment from the South Ditch. The remaining bullets have been checked for consistency with approved responses to comments 54, 55, and 56. The revised response is as follows:

- North Ditch surface water samples had detections of arsenic, aluminum, barium, cadmium, cobalt, copper, iron, lead, manganese, nickel, selenium, thallium, zinc, fluoride, and sulfate in the filtered samples at concentrations greater than the ECOPC screening levels in at least one North Ditch surface water sampling location. These same analytes and beryllium at ND-5 were detected greater than the ECOPC screening level in the unfiltered samples. Laboratory analysis was not completed for hardness; therefore, the acute ambient water quality criteria could not be calculated for some analytes. Dissolved and total Iron, manganese, and total fluoride were detected at concentrations greater than the Illinois general use water quality standards.
- North Ditch sediments contain arsenic, copper, lead, manganese, cadmium, iron, nickel, silver, and zinc at concentrations greater than their respective ECOPC screening level.
- In the settling ponds, total barium, copper, iron, and manganese were detected at concentrations greater than the ECOPC screening level in both settling ponds and cobalt was detected greater than the ECOPC screening level at SP-2. Total iron and manganese were detected greater than the general use water quality criteria at SP-1. Dissolved barium, copper, iron, and manganese were detected greater than the ECOPC screening level in both settling ponds. Dissolved aluminum, cadmium, lead, and zinc were detected greater than the ECOPC screening level at SP-2 only. The concentration of dissolved manganese at SP-1 is greater than the general use water quality criteria. Ammonia was also detected greater than the ECOPC screening level of 4.6 mg/L in both settling ponds.
- Arsenic, cadmium, copper, lead, manganese, and zinc were detected in the sediment within both settling ponds at concentrations greater than ECOPC screening levels. Chromium iron, mercury, nickel, and silver were also detected in sediment in settling pond SP-2 at concentrations greater than the ECOPC screening level. These analytes were not tested in settling pond SP-1.
- The surface water sample from seep N004 obtained in July 2009 contained aluminum, barium, cadmium, copper, iron, lead, manganese, zinc, ammonia, and sulfate at concentrations greater

than their respective ECOPC screening levels. The concentration of iron is also greater than the Illinois General Use Water Quality Standard.

- The surface water sample obtained from the South Ditch in April 2009 detected barium, cadmium, cobalt, copper, iron, lead, manganese, nickel, silver, zinc, ammonia, nitrate as N, and sulfate greater than the ECOPC screening levels and iron and manganese at concentrations greater than the Illinois General Water Quality Use Standards.
- The sediment sample obtained from the South Ditch in April 2009 detected arsenic, cadmium, copper, iron, lead, manganese, mercury, silver and zinc at concentrations greater than ECOPC screening levels.
- Impacted sediment and surface water from the North Ditch do not migrate off-site; therefore, the primary transport mechanism for surface water and sediment from the North Ditch is migration of COPCs into the groundwater.
- Impacted surface water and sediment that becomes entrained in the surface water from the South Ditch flows into the eastern portion of DePue Lake.
- The Division Street Ditch is present west of the Slag Pile Area, which could discharge to the lake during heavy rains. However, as outlined in the March 23, 2007 letter to IEPA project manager Richard Lange and approved on June 27, 2007, during three years of implementing the surface water run-off program only one sampling event occurred (defined as a rainfall event of 1-inch or more that occurs at least 72 hours from a previous rainfall event during working hours) and observations along the south and west of the perimeter of the Site showed no sign of surface water flowing off the Site. The letter concluded that there is no evidence that significant surface water run-off is leaving the Site.

***Comment 85**. Appendix N: This appendix provides several maps that show concentrations of various metals detected in surface soil, non-native material, native material, etc. During Illinois EPA's review of the Phase 1 RI, Illinois EPA requested contouring to better illustrate contaminant distribution. The DePue Group replied that contouring would be used in the Phase 2 RI if requested by Illinois EPA. At this time, Illinois EPA is requesting a more user-friendly depiction of contaminant concentrations and distribution than what is used for Appendix N.*

Response: In ENVIRON's experience, the contaminant distribution in soil is likely better represented using Thiessen Polygon maps instead of contour maps. Thiessen polygons is a method for visually presenting irregularly distributed points that results in the more true representation of areas on the plane. It is a method of spatial statistics in which an area is subdivided into subregions, or polygons, in order to predict values at unobserved locations. Thiesssen polygons can be quickly used to determine if additional soil sampling would be valuable to the risk evaluation. In addition, the polygons can be used to guide soil remediation programs more efficiently that contours. Thiessen Polygon maps may be presented in the ICPR Report and/or scoping document.

***Illinois EPA Review**: Illinois EPA has requested a more user friendly depiction be provided in this document, not as part of a later submittal for the ICPR report. Polygon maps would be acceptable.*

Review Response: Polygon maps have been prepared for soil samples obtained for native and non-native materials and will be added to Appendix N of the revised report and are included in Attachment 8. The polygon maps have been prepared for the analytes included in the previous Appendix N with the exception of pH, total sulfur, and nitrate-nitrite because an HCOPC screening level has not been established or the analyte was not detected greater than the HCOPC screening level.

Comments Provided by the Village of DePue

Comment V3. There is incomplete data concerning the extent of the aquitard underneath the slag pile area that separates the upper water bearing unit from the lower aquifer. There is also insufficient data regarding the vertical hydraulic gradient between groundwater in the upper water bearing unit and groundwater in the lower aquifer.

Response: The investigations performed at the site have adequately characterized the extent of the aquitard and the vertical hydraulic gradients between units at the site. Fifteen soil borings have been advanced in the Slag Pile Area that penetrate the aquitard to provide aquifer thickness. During drilling activities conducted as part of the Phase II RI, the DePue Group took great precautions (See response to comment 9a and the Phase II RI Work Plan) to avoid advancing soil borings through the aquitard directly below the Slag Pile, thus avoiding creating potential preferential pathways between the UWBZ and the Lower Aquifer. In addition, multiple soil borings advanced in the Slag Pile encountered the top of the aquitard unit. Finally, there are nearly 50 nested monitoring well pairs or trios as outlined in Table 4-11 of the Phase II RI with 22 well pairs existing to measure the vertical gradient between the UWBZ and the Lower Aquifer. Nine well pairs are located in the Slag Pile Area alone.

***Illinois EPA Review**: Sufficient data has been collected to document the extent of the aquitard, as well as for determining the vertical hydraulic conductivities between the UWBZ and the Lower Aquifer. The primary issue is the presentation of that data in the report. The development of a contour map to show the spatial distribution of hydraulic conductivities across the site is a better tool to determine the locations of potential problem areas for contaminant migration, as well as for showing areas where the aquitard is absent than the use of laborious and obscure text. Currently, this information is poorly presented in the current Phase II RI Report figures, and text revisions proposed in the response to comments on this issue are not an improvement. Any inconsistencies between the aquifer thickness data in tables and what is currently shown on the figures also needs to be resolved.*

Review Response: We disagree that the text provided in the responses is laborious and obscure. As discussed in the responses above, not all data is suited for contouring, particularly in the instance of attempting to contour vertical hydraulic conductivity data of an aquitard layer that was deposited in an alluvial environment with order of magnitude variations in both long and short distances between sample points. Presenting this data with contours assumes that there is a gradient in the vertical conductivities from one point to the next, which is not an accurate assumption. Figure 4-12B has been prepared to provide a visual representation of the aquitard vertical hydraulic conductivities on a map. In addition, an updated Figure 4-7 has been prepared that uses contours instead of shading to depict the aquitard thickness as outlined in the response to comment 16.

Comment V4. There is insufficient interpretation of data concerning the effectiveness of the IRM walls and the infiltration trenches. Concentration profiles indicate the north IRM wall is not effective in protecting groundwater, but that the center and south IRM walls (with underdrains) down-gradient from the wall are creating a hydraulic capture zone that is intercepting the contaminated groundwater in the upper water bearing zone. Interpretation of the data is required to address the primary reason groundwater contaminants in the upper water bearing unit are not migrating beyond the center and south IRM walls, and to identify possible exposure pathways of contaminants in this groundwater to nearby residents.

Response: The responses to the IEPA comments above provide additional interpretation of the data obtained concerning the effectiveness of the IRM walls and infiltration trenches.

***Illinois EPA Review**: It is agreed that the effectiveness of the IRM wall/trenches has not been completely evaluated. This was addressed in the review of response to comments 38, 40-43, 84i), and 84j).*

Review Response: See review responses to comments 38, 40-43, 84i, and 84j.

Conclusion

We trust that these responses provide sufficient information to complete Revision 1 for the Preliminary Phase II RI Report. Please contact us if you have any questions regarding this response.

Respectfully submitted,

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Joe Abel – ExxonMobil Corporation
Jeff Groy – CBS Operations Inc.
Russ Cepko – CBS Operations Inc.
Steve Walker – Terra Environmental Service

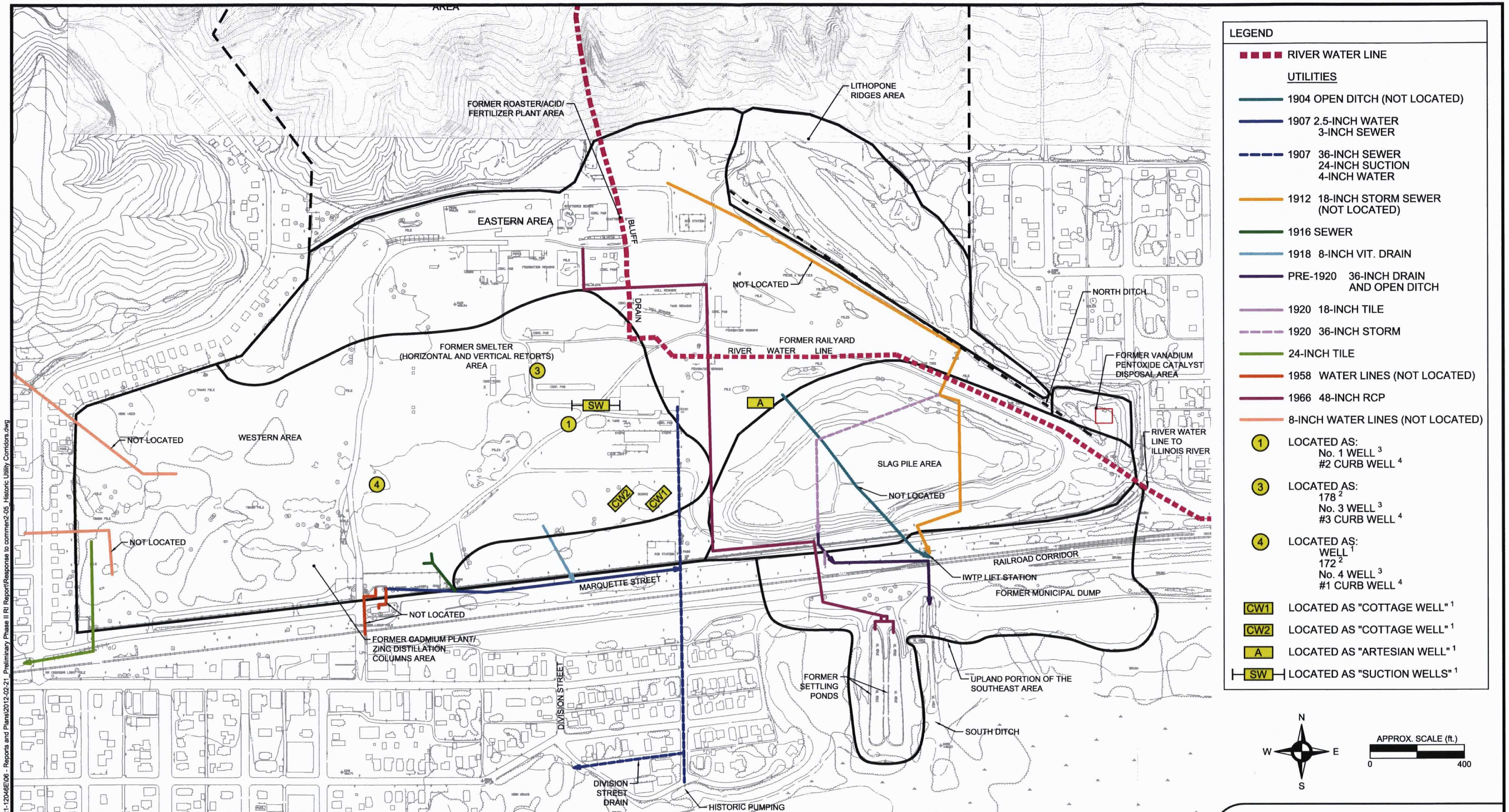
Attachments

ATTACHMENT 1

ATTACHMENT 1

Attachment 1

Revised Figures



NOTES:

1. *Plan of the Nassau Plant of the Mineral Point Zinc Co.*, Mineral Point Zinc Company, Revised 1908.
2. *New Jersey Zinc Company Mineral Point Zinc Division*, Factory Insurance Association, 1959.
3. *General Plant Maps Railroad Tracks DAP & Acid Plant*, New Jersey Zinc Company, 1966.
4. *New Jersey Zinc Company Existing Facilities*, Chamlin & Associates, Inc., 1972.

ENVIRON

HISTORIC UTILITY CORRIDORS
PHASE II REMEDIAL INVESTIGATION
DEPUE SITE
DEPUE, ILLINOIS

DATE: 7/15/12	CONTRACT NUMBER: 21-12046E4		FIGURE 2-5
DRAFTER: ELS/APR/CCS	APPROVED:	REVISED:	

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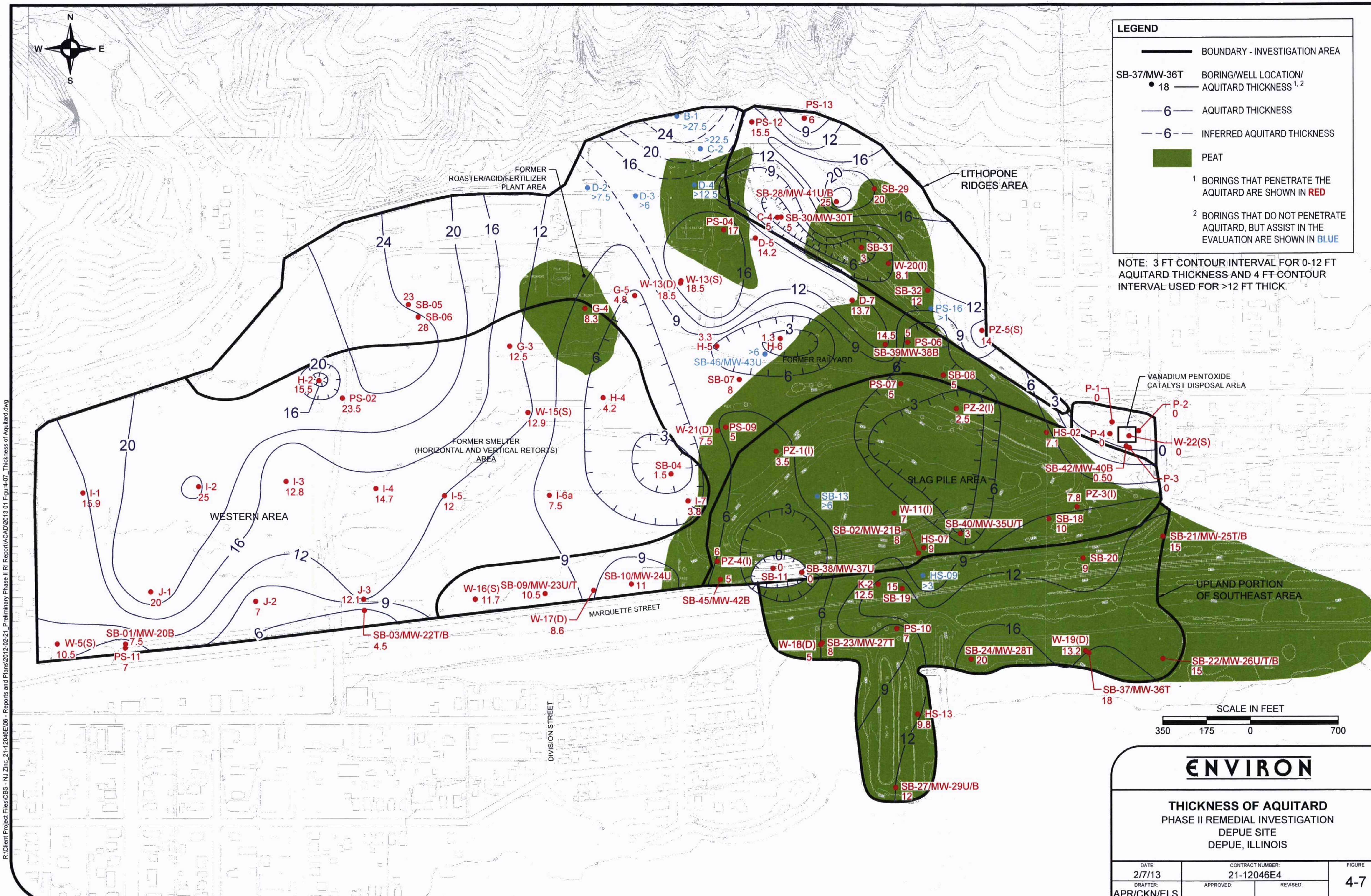
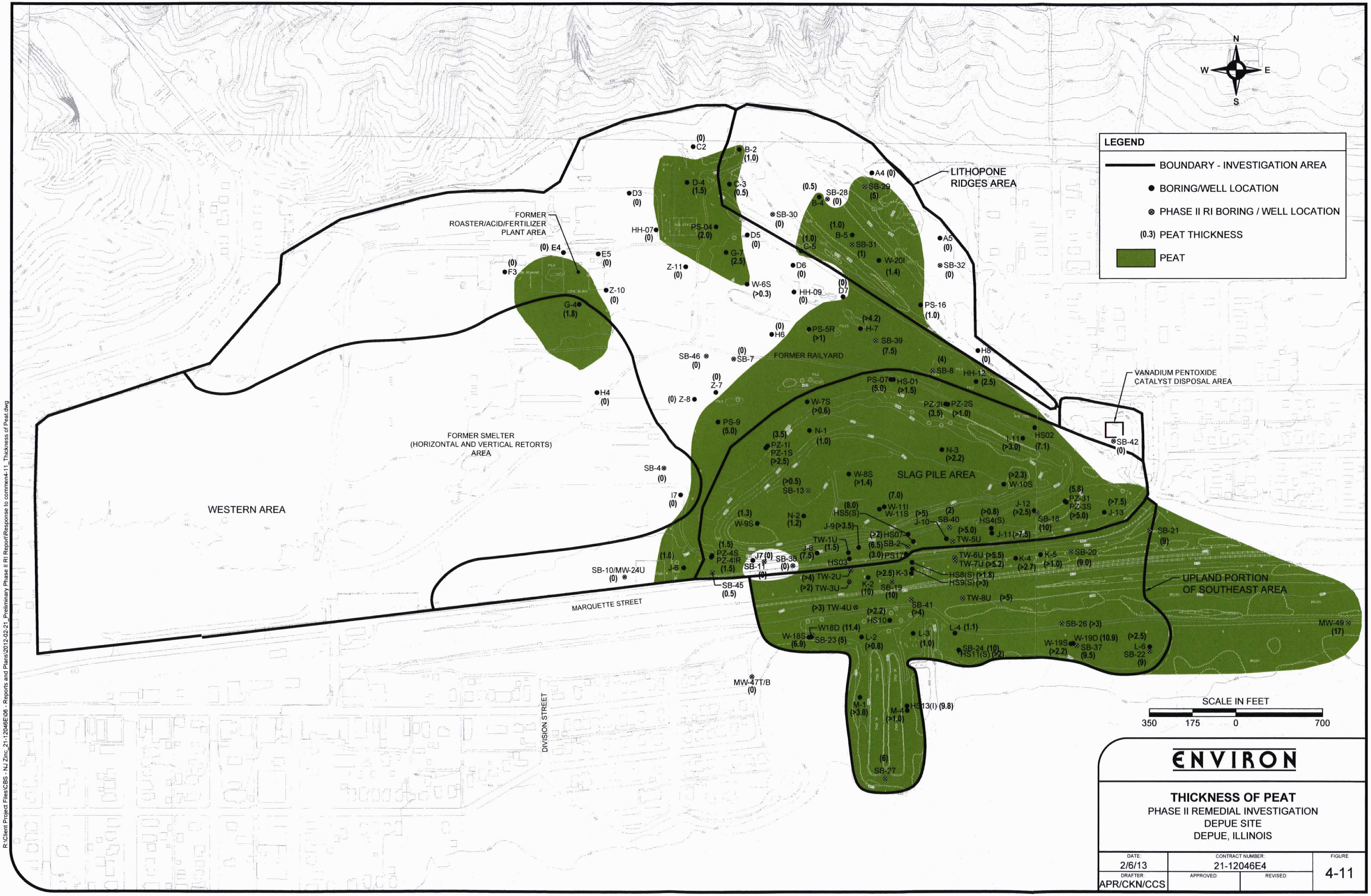


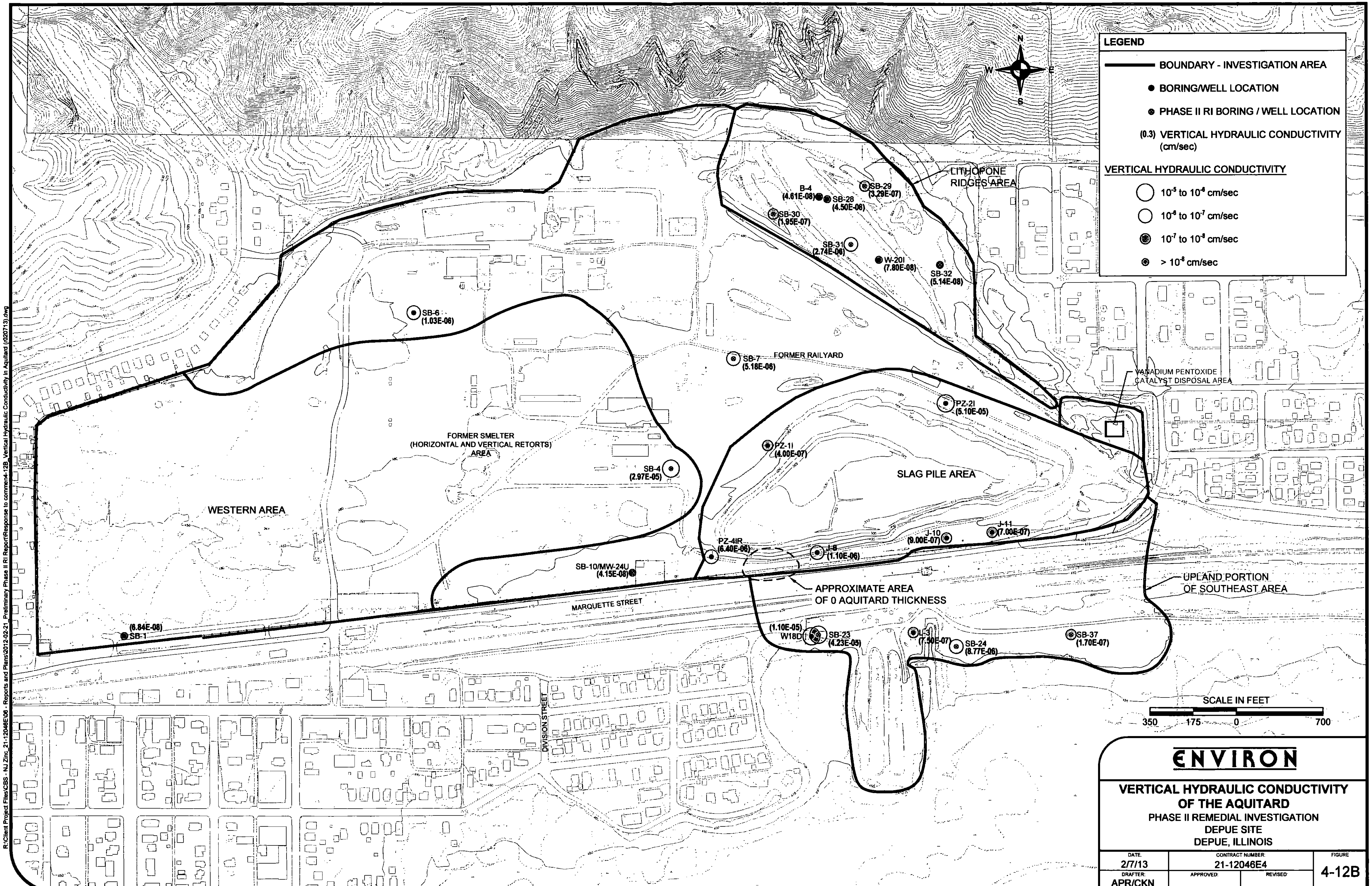
ENVIRON

THICKNESS OF AQUITARD
PHASE II REMEDIAL INVESTIGATION
DEPUE SITE
DEPUE, ILLINOIS

DATE:	CONTRACT NUMBER:		FIGURE
2/7/13	21-12046E4		4-7
DRAFTER:	APPROVED:	REVISED:	
APR/CKN/ELS			



LEGEND
BOUNDARY - INVESTIGATION AREA
BORING/WELL LOCATION
PHASE II RI BORING / WELL LOCATION
(0.3) PEAT THICKNESS
PEAT
LITHOPONE RIDGES AREA
FORMER ROASTER/ACID/FERTILIZER PLANT AREA
FORMER RAILYARD
FORMER SMELTER (HORIZONTAL AND VERTICAL RETORTS) AREA
WESTERN AREA
SLAG PILE AREA
VANADIUM PENTOXIDE CATALYST DISPOSAL AREA
UPLAND PORTION OF SOUTHEAST AREA
MARQUETTE STREET
DIVISION STREET
SCALE IN FEET
350 175 0 700
ENVIRON
THICKNESS OF PEAT
PHASE II REMEDIAL INVESTIGATION
DEPUE SITE
DEPUE, ILLINOIS
DATE: 2/6/13
DRAFTER: APR/CKN/CCS
CONTRACT NUMBER: 21-12046E4
APPROVED:
REVISED:
FIGURE 4-11
R:\Client Project Files\CBS - NJ Zinc_21-12046E06 - Reports and Plans\2012-02-21_Preliminary Phase II RI Report\Response to comment4-11_Thickness of Peat.dwg



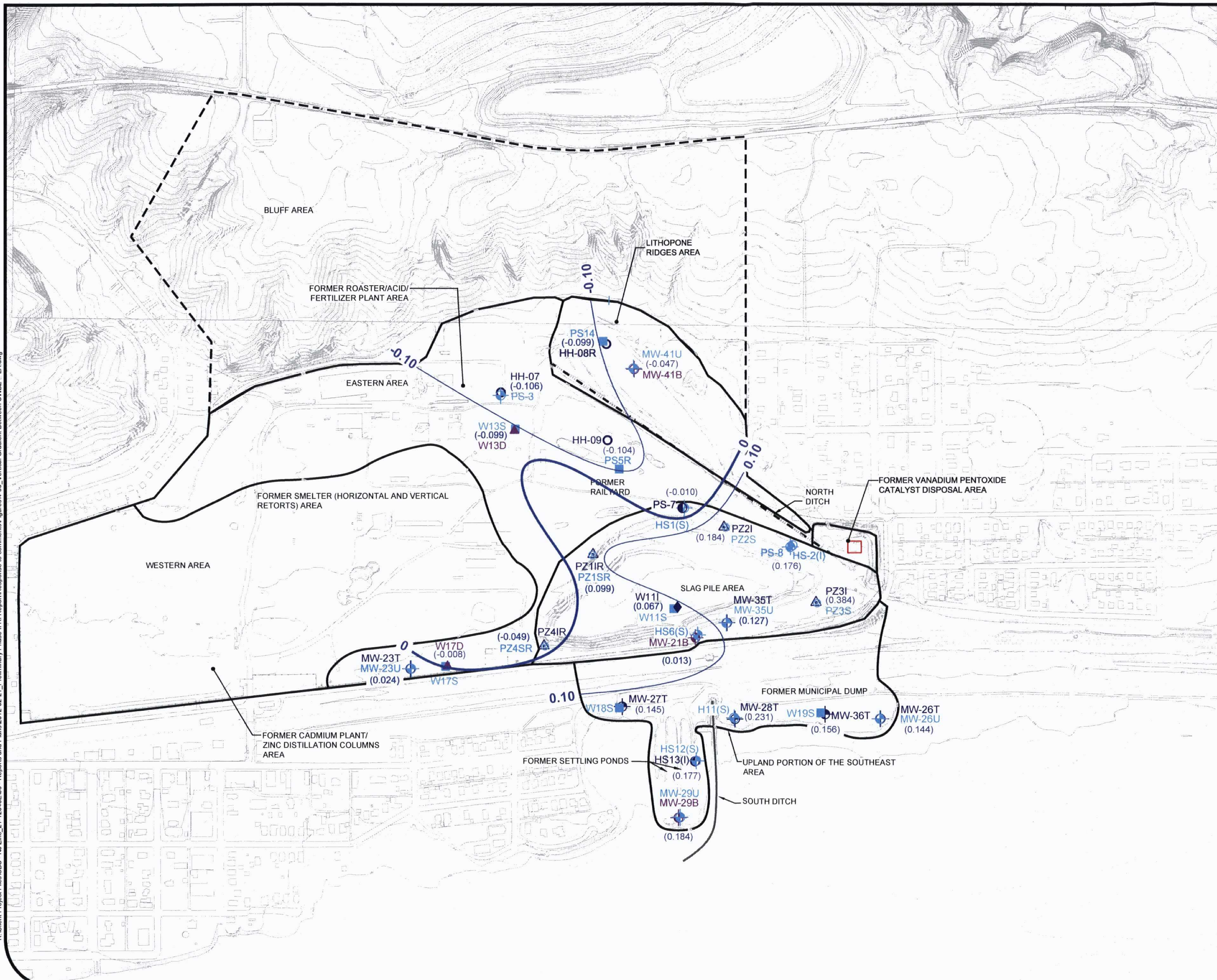
ENVIRON

VERTICAL HYDRAULIC CONDUCTIVITY OF THE AQUITARD

PHASE II REMEDIAL INVESTIGATION
DEPUE SITE
DEPUE, ILLINOIS

DATE:	CONTRACT NUMBER:		FIGURE
2/7/13	21-12046E4		4-12B
DRAFTER: APR/CKN	APPROVED:	REVISED:	

R:\Client Project Files\CBS - NJ Zinc_21-12046E\06 - Reports and Plans\2012-02-21 Preliminary Phase II RI Report\Response to comment4-12B Vertical Hydraulic Conductivity in Aquitard (r020713).dwg



LEGEND:

- APPROXIMATE AREA OF FORMER PLANT SITE AND UPLAND PORTION OF THE SOUTHEAST AREA
- APPROXIMATE AREA OF BLUFF AREA
- HISTORICAL FEATURE

PHASE I RI SAMPLING LOCATIONS:

- W2D ▲ MONITORING WELL (BASE OF LOWER AQUIFER)
- W5S ◆ MONITORING WELL (TOP OF LOWER AQUIFER)
- W11S ■ MONITORING WELL (UWBZ OR AQUITARD)
- PZ4S ⊗ PIEZOMETER (UWBZ OR AQUITARD)
- PZ4IR △ PIEZOMETER (TOP OF LOWER AQUIFER)

OTHER LOCATIONS

- HH-03 ○ HHI/DANIEL B. STEPHENS TEMPORARY AND PERMANENT MONITORING WELL
- PS-11 ◐ EXISTING MONITORING WELL OR PIEZOMETER (TOP OF LOWER AQUIFER)
- PHASE II RI MONITORING WELL
- GROUNDWATER SAMPLING LOCATION (UWBZ)
- GROUNDWATER SAMPLING LOCATION (TOLA)
- GROUNDWATER SAMPLING LOCATION (BOLA)
- UWBZ UPPER WATER-BEARING ZONE
- TOLA TOP OF LOWER AQUIFER
- BOLA BASE OF LOWER AQUIFER
- (0.184) VERTICAL GRADIENT

NOTES:

1. BASE MAP FROM FIGURE 1 OF PHASE 1 SITE-WIDE REMEDIAL INVESTIGATION DATA REPORT, ADDENDUM 1 DATED JANUARY 30, 2001 AT A SCALE OF 1" = 400', PROVIDED BY GOLDER ASSOCIATES.
2. ALL LOCATIONS ARE APPROXIMATE.
3. <0 DOWNWARD VERTICAL GRADIENT
4. >0 UPWARD VERTICAL GRADIENT
5. 0 NEUTRAL VERTICAL GRADIENT

SCALE IN FEET

500 250 0 500

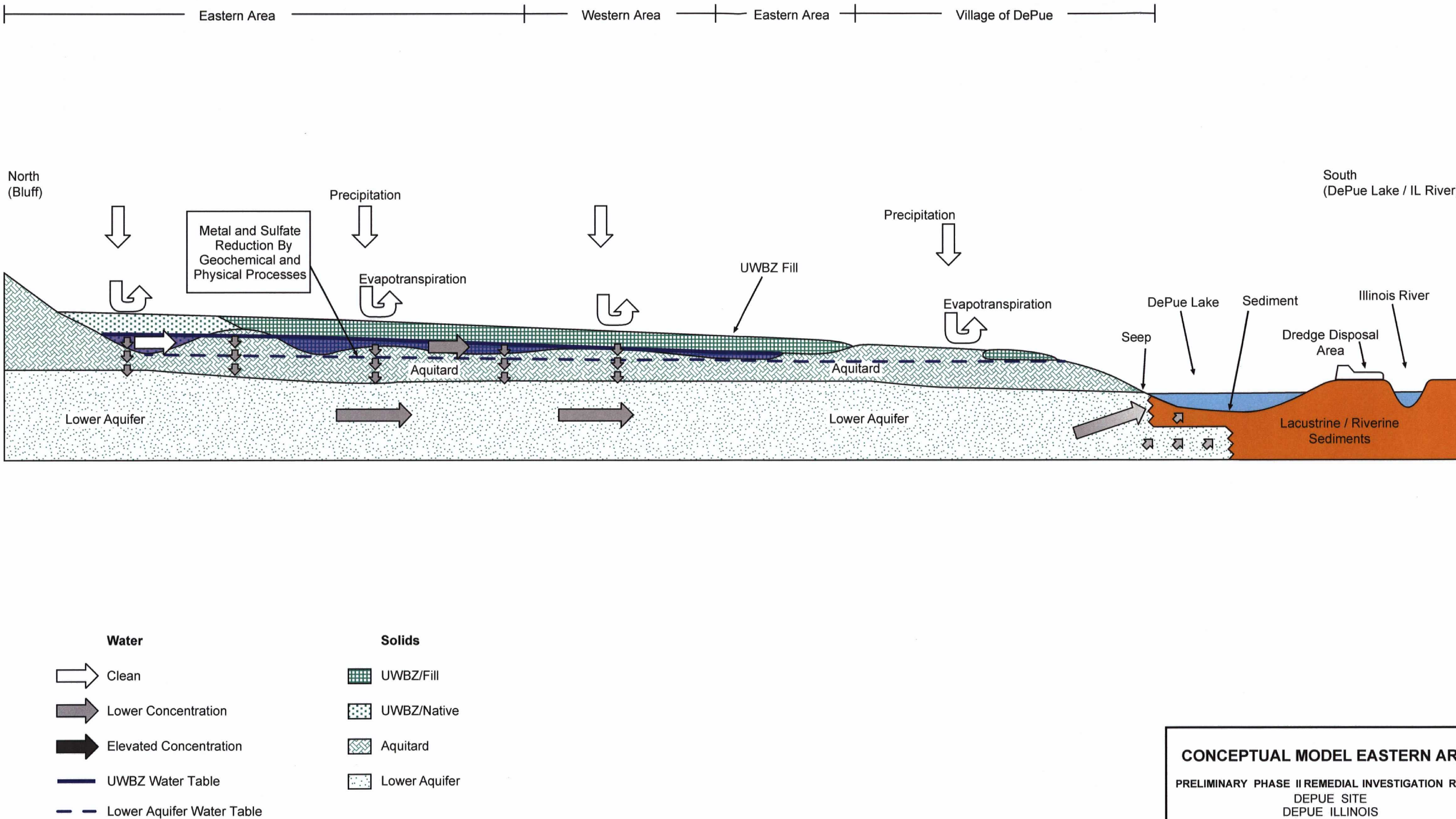
ENVIRON

VERTICAL GROUNDWATER GRADIENTS BETWEEN UPPER WATER BEARING ZONE AND BOTTOM OF LOWER AQUIFER

PHASE II REMEDIAL INVESTIGATION
DEPUE SITE
DEPUE, ILLINOIS

DATE:	CONTRACT NUMBER:		FIGURE
2/11/13	21-12046E6		4-53
DRAFTER: APR/ELS	APPROVED:	REVISED:	

R:\Client Project Files\CBS - NJ Zinc_21-12046E06 - Reports and Plans\2012-02-21_Preliminary Phase II RI Report\Response to comments\Figures\4-53_Vertical Gradient Between UWBZ - LA.dwg



CONCEPTUAL MODEL EASTERN AREA

PRELIMINARY PHASE II REMEDIAL INVESTIGATION REPORT

DEPUE SITE
DEPUE ILLINOIS

ENVIRON

FIGURE
6-4

ATTACHMENT 2

ATTACHMENT 2

Attachment 2

Copy of Field Logbook for SB-7

Location ______ Date 10/14/07

Project / Client ______

15-25 (8ft rec)

15-25 ft Sand + gravel, grayish brown (20'), brown (21.5'), orange brown (21.5-25') rounded-subrounded, coarse grained sand

No UWBZ encountered, MW-43 u will not be installed at this location

SB-07

0-5 (5 ft rec)

0-1.5 Sandy silt, lt brown, dry, loose (Fill)

1.5-2.0 Fill, sand, silt, slag, residue, Tr. gravel, dry, loose, black

2-5 Sandy silt w/ Tr. clay, mottled, br, dk br, gray, moist, mod firm. Fill

Loca...... ______ 1/14/07

Project / Client ______

Sample SB-07-1-2 @ 133c

5-10 ~~Same~~ (5 rec)

Same as above, brown gray mottled, Fill/disturbed

10-15 (4' rec)

10-15 gravelly sand, brown, moist-wet, rounded-subrounded Tr. shells.

15-25 (10 ft rec)

15-25 Same as above, Tr. cobbles, wet

Shelby Tube of fill 2-4' @ 1350
5 gallon bucket @ 1350

Shelby ~~tube~~ Tube @ 8-10' @ 1400

JW

ATTACHMENT 3

ATTACHMENT 3

Topic 14

Cation Exchange

Outline:

- **Cation Exchange**
- Cation Exchange Capacity
- **Calculations**

1. **Because soils have negative charge they are able to hold positively charged cations.**

   The soil solution consists of a water layer around the soil particle and water in the micropores.

   There are cations attached to the colloids and in the soil solution.

   Cation exchange takes place when one of the cations in the soil solution replaces one of the cations an the soil colloid.

   This exchange only takes place when the cations in the soil solution are not in equilibrium to the cations on the soil colloid. This is almost always the case

   Leaching, fertilizer addition, plant removal, etc.. all keep this system from remaining static.

2. **Cation Exchange Capacity**

   - the ability or capacity of a soil colloid to hold cations.
   - this is directly dependent on the amount of charge on the soil colloid.

   The amount of cations a soil can hold is dependent on:
   - how much clay is present.
   - type of clay that is present.
   - how much organic matter is present.
   - Hydrous Oxides of Fe and Al (Sesquioxides)
   - pH

   The amount of cations a soil can hold is called its **CATION EXCHANGE CAPACITY (CEC)**
   It is expressed as milliequivalents per 100 g soil (meq/100g)

   A Cecil Ap horizon CEC = 5 meq/100g soil
   A Norfolk Ap horizon CEC = 2 meg/100g soil
   - Sandy soils with little organic matter have low CEC
   - Clayey soils with high organic matter have high CEC

Type of colloid	CEC
1:1 clay (kaolinite)	3-15 meq/100g soil

2:1 clays

Montmorillonite	100 meq/100g soil
Illite	10-40 meq/100 g soil
Vermiculite	100-150 meq/100 g soil
Organic colloids (humus)	200-300 meq/100 g soil
Fe and Al oxides	very small, if any charge

Some interesting trivia about clay. Geophagy

and Quicksand

Remember that a meq of any cation is that amount of cation required to replace 1 meq of another cation.
Question then is how many meq of Ca++ would it take to replace 1 meq of H+ ?

The answer is 1 meq

How many grams of Ca does it take to replace 1meq of H+ ?

1 eq of Ca = 40g/2 = 20 g to 1 eq or 0.02 g to 1 meq
1 eq of H = 1g/1 = 1 g to 1 eq or 0.001 g to 1 meq

Therefore it would take 0.02 g of Ca to replace 0.001 g of H
Remember that 1 meq of anything equals 1 meq of anyother thing.

Additional Examples

1. If a soil had 2 meq of Ca then it would have 2 * .020 = 0.040g Ca

   X / 2,000,000 = 0.040 g / 100 g

   X = 800 lbs/acre.
2. How many lbs/acre of Ca would it take to replace 1 meq/100g of H^+?

   It would take 1 meq/100g of Ca equivalent weight.

   40 / 2 = 20

meq wt = 0.020g

X / 2,000,000 = (0.020g * 2000) / 100g

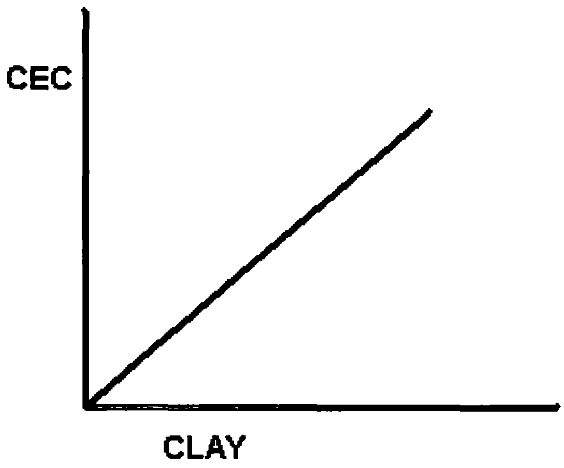
X = 400 lbs of Ca.

1. **Factors Affecting CEC**
    1. Amount of Clay (% clay in the soil)
    2. Type of clay present
    3. Organic matter content
    4. Hydrous oxides of Fe and Al
    5. pH

2. **Soil Texture**

The amount of clay, which is the colloidal fraction, helps determine the CEC.

As the clay increases the cation exchange capacity will also increase.



3. **Organic Matter**

For each percent humus in the soil the CEC will increase about 2 meg/100g. m is the most practical and easy way for a farmer to increase the CEC of a soil. This is practical in your gardens, etc....

The most practical way to increase the CEC of a given soil is to add organic matter and lime.

4. **Characteristic of Cation**

Order of the strength of adsorption of cations $Al^{+3} > H+ > Ca^{+2} > Mg^{+2} > K^{+} >= NH_4^{+} > Na^{+}$

This is called the lyotropic series

The lyotropic series lists the common soil cations in order of their strength of bonding to the cation exchange surface. Ionic charge and size are the most important factors in determing an ion's position in the lyotropic series.

Importance of CEC

1. Indicates the nutrient holding capacity of a soil.
2. Determines how often and how much lime must be added to a soil.
3. The CEC determines how crop nutrients must be applied. Whether the material may be broadcast or placed in a band.

5. Source of charge on colloids.

Permanent charge of clays results from ismorphous substitution, which is the replacement of one atom by another of similar size in a crystal structure.. When a substituting cation has a smaller valence than the cation it is replacing, there is an increase in the net negative charge on the structure.

pH dependent charge
Organic matter
Edges of Kaolinite (Si-OH)
Oxides of iron and aluminum (Al-OH)
amorphous clays at high pH

ATTACHMENT 4

ATTACHMENT 4

Attachment 4

Local and State-Plane Coordinates

Coordinate Conversions for OU-3 Soil Borings and Monitoring Wells
DePue Site
DePue, Illinois

Location ID	Local Coordinate System[1]		State-Plane Coordinate System[2]	
	Easting	Northing	Easting	Northing
A-1	11734.73	11213.25	2534589.18	1699982.45
A-2	11878.63	11110.55	2534734.26	1699881.50
A-3	12006.12	11032.79	2534862.65	1699805.28
A-4	12214.43	10883.21	2535072.69	1699658.23
A-5	12491.36	10620.06	2535352.66	1699398.44
AA-10	10150.50	13482.50	2532978.50	1702232.42
AA-5	12730.00	13673.50	2535555.29	1702454.64
ABC-1	11341.83	10361.50	2534206.39	1699125.98
ABC-2	11386.58	10346.85	2534251.30	1699111.87
ABC-3	11497.81	10342.68	2534362.56	1699109.04
ABC-4	11312.93	10360.21	2534177.50	1699124.34
ABC-5	10760.03	10303.41	2533625.38	1699060.85
ABC-6	10617.15	10257.86	2533483.05	1699013.57
ABC-7	11497.48	10265.67	2534363.14	1699032.04
B-1	11392.35	11118.06	2534247.98	1699883.12
B-2	11675.58	10977.26	2534532.82	1699745.75
B-3	11836.12	10913.81	2534694.08	1699684.25
B-4	12001.10	10785.33	2534860.55	1699557.77
B-5	12133.92	10632.37	2534995.15	1699406.42
B-6	12559.80	10393.33	2535423.76	1699172.56
C-1	11153.48	11021.46	2534010.30	1699783.63
C-2	11487.18	10987.05	2534344.34	1699753.26
C-3	11635.25	10836.60	2534494.16	1699604.61
C-4	11795.93	10714.07	2534656.25	1699484.03
C-5	11927.28	10567.83	2534789.30	1699339.39
CSB-1	11599.87	9800.06	2534471.00	1698567.68
CSB-2	11800.04	9799.42	2534671.13	1698569.47
CSB-3	11800.67	9999.49	2534669.41	1698769.54
CSB-4	11599.87	9998.85	2534468.66	1698766.47
CWP-J	13007.13	12397.36	2535847.41	1701181.92
D-2	11027.57	10832.09	2533886.64	1699592.75
D-3	11222.36	10798.79	2534081.79	1699561.81
D-4	11462.76	10843.02	2534321.62	1699608.94
D-5	11708.16	10631.74	2534569.46	1699400.65
D-6	11894.20	10509.66	2534756.91	1699280.82
D-7	12096.75	10382.64	2534960.92	1699156.26
E-1	10326.54	10703.82	2533187.24	1699455.99
E-2	10650.67	10795.92	2533510.23	1699552.02
E-3	10798.49	10892.22	2533656.89	1699650.10
E-4	10952.25	10558.99	2533814.55	1699318.74
E-5	11094.89	10553.15	2533957.23	1699314.63
E-6	11190.28	10601.14	2534052.04	1699363.77
F-1	10302.87	10521.94	2533165.72	1699273.84
F-2	10460.36	10495.93	2533323.49	1699249.73
F-3	10713.32	10480.42	2533576.58	1699237.29
G-1	9905.05	10272.38	2532770.91	1699019.46
G-2	10236.51	10255.90	2533102.50	1699007.00

Coordinate Conversions for OU-3 Soil Borings and Monitoring Wells
DePue Site
DePue, Illinois

Location ID	Local Coordinate System[1]		State-Plane Coordinate System[2]	
	Easting	Northing	Easting	Northing
G-3	10713.45	10198.89	2533580.03	1698955.77
G-4	11017.30	10350.10	2533882.05	1699110.65
G-5	11219.60	10400.63	2534083.72	1699163.63
G-7	11621.79	10561.02	2534483.95	1699328.88
H-2	9942.09	10061.60	2532810.43	1698809.14
H-4	11090.41	9992.70	2533959.35	1698754.15
H-5	11553.48	10198.79	2534419.91	1698965.84
H-6	11807.55	10229.91	2534673.57	1699000.03
H-7	12168.11	10254.19	2535033.78	1699028.68
H-8	12645.43	10165.25	2535512.07	1698945.52
HH-03	11777.92	11831.85	2534625.07	1700601.55
HH-03B	11774.81	11828.99	2534622.00	1700598.65
HH-04	11785.55	11842.79	2534632.58	1700612.58
HH-05	11171.75	11623.83	2534021.46	1700386.19
HH-06	11169.35	11612.80	2534019.19	1700375.14
HH-07	11335.24	10650.78	2534196.38	1699415.17
HH-08	11886.81	10904.10	2534744.88	1699675.16
HH-08R	11891.78	10903.74	2534749.85	1699674.85
HH-09	11898.54	10401.37	2534762.53	1699172.59
HH-10	11947.37	9853.63	2534817.80	1698625.46
HH-11	12257.90	9844.28	2535128.39	1698619.88
HH-12	12637.74	10039.80	2535505.85	1698819.98
HS-01(S)	12302.31	10048.33	2535170.38	1698824.45
HS-02(I)	12876.96	9853.45	2535747.23	1698636.54
HS-03(S)	12123.98	9322.60	2535000.63	1698096.59
HS-04(S)	12700.40	9445.79	2535575.50	1698226.75
HS-05(S)	12362.41	9421.51	2535237.85	1698198.38
HS-06(S)	12374.88	9386.34	2535250.74	1698163.37
HS-07(I)	12384.03	9391.97	2535259.82	1698169.11
HS-08(S)	12378.53	9307.99	2535255.31	1698085.06
HS-09(S)	12377.78	9282.93	2535254.85	1698060.00
HS-10(S)	12287.71	9073.32	2535167.28	1697849.31
HS-11(S)	12567.77	8953.15	2535448.70	1697732.53
HS-12(S)	12365.80	8730.20	2535249.39	1697507.14
HS-13(I)	12358.44	8727.41	2535242.06	1697504.27
I-1	8996.87	9612.93	2531870.66	1698349.05
I-11	12828.05	9810.16	2535698.84	1698592.66
I-2	9459.87	9637.50	2532333.28	1698379.22
I-3	9809.74	9658.38	2532682.85	1698404.34
I-4	10170.47	9629.90	2533043.85	1698380.23
I-5	10448.61	9600.12	2533322.29	1698353.82
I-6	10873.66	9602.24	2533747.24	1698361.08
I-7	11437.56	9579.66	2534311.31	1698345.33
I-9	12262.31	10034.23	2535130.56	1698809.86
J-1	9268.85	9216.52	2532147.26	1697955.95
J-10	12517.68	9403.12	2535393.32	1698181.88
J-11	12702.50	9426.15	2535577.83	1698207.14

Coordinate Conversions for OU-3 Soil Borings and Monitoring Wells
DePue Site
DePue, Illinois

Location ID	Local Coordinate System[1]		State-Plane Coordinate System[2]	
	Easting	Northing	Easting	Northing
J-12	12874.48	9517.48	2535748.70	1698300.55
J-13	13159.40	9510.63	2536033.65	1698297.16
J-2	9688.01	9178.48	2532566.80	1697922.99
J-3	10121.10	9186.59	2532999.71	1697936.34
J-6	11450.34	9285.21	2534327.55	1698051.04
J-7	11732.00	9314.88	2534608.81	1698084.13
J-8	11992.49	9345.11	2534868.91	1698117.51
J-9	12161.55	9367.79	2535037.67	1698142.24
K-1	11915.52	9203.66	2534793.61	1697975.14
K-2	12200.75	9246.19	2535078.29	1698021.11
K-3	12376.38	9263.01	2535253.69	1698040.06
K-4	12798.90	9324.66	2535675.41	1698106.83
K-5	12901.45	9339.98	2535777.76	1698123.39
L-2	12174.23	9006.03	2535054.61	1697780.64
L-3	12383.76	9019.92	2535263.93	1697797.07
L-4	12552.41	9021.23	2535432.53	1697800.42
L-6	13343.64	8966.58	2536224.27	1697755.35
LY-1	12240.20	9533.46	2535114.35	1698308.85
LY-2	12227.96	9531.62	2535102.14	1698306.86
M-1	12167.15	8762.38	2535050.39	1697536.92
M-2A	12184.23	8432.95	2535071.36	1697207.71
M-3	12352.73	8432.04	2535239.84	1697208.84
M-4	12359.46	8708.70	2535243.30	1697485.57
MW-01	10485.98	10621.74	2533347.62	1699375.84
MW-10	10350.33	10377.25	2533214.88	1699129.73
MW-20B	9168.04	9008.08	2532048.93	1697746.29
MW-21B	12362.55	9370.93	2535238.60	1698147.81
MW-22B	10120.14	9142.15	2532999.27	1697891.89
MW-22T	10123.87	9142.11	2533003.00	1697891.90
MW-23T	10855.98	9208.80	2533734.20	1697967.45
MW-23U	10859.01	9209.18	2533737.23	1697967.86
MW-24U	11205.26	9247.43	2534082.96	1698010.31
MW-25B	13343.41	9437.22	2536218.49	1698225.98
MW-25T	13350.59	9432.69	2536225.73	1698221.53
MW-26B	13343.11	8947.81	2536223.96	1697736.58
MW-26T	13338.71	8947.68	2536219.57	1697736.40
MW-26U	13335.30	8947.75	2536216.16	1697736.42
MW-27T	11974.69	9011.53	2534855.04	1697783.72
MW-28T	12572.61	8946.00	2535453.62	1697725.44
MW-29B	12270.16	8434.22	2535157.26	1697210.02
MW-29U	12279.22	8436.36	2535166.29	1697212.27
MW-30T	11811.09	10715.25	2534671.39	1699485.39
MW-31T	10909.44	10960.50	2533767.02	1699719.72
MW-32T	12088.08	11166.27	2534943.02	1699939.75
MW-33T	12613.25	10942.44	2535470.74	1699722.29
MW-34T	12941.55	10244.45	2535807.20	1699028.30
MW-35T	12530.51	9448.68	2535405.61	1698227.59

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Location ID	Local Coordinate System[1]		State-Plane Coordinate System[2]	
	Easting	Northing	Easting	Northing
MW-35U	12527.25	9447.88	2535402.36	1698226.75
MW-36T	13048.54	8971.32	2535929.17	1697756.52
MW-37U	11894.50	9293.71	2534771.54	1698064.92
MW-38B	12230.64	10205.60	2535096.87	1698980.84
MW-39U	12376.27	9157.19	2535254.83	1697934.25
MW-40B	13197.62	9798.46	2536068.48	1698585.44
MW-41B	12034.17	10776.62	2534893.71	1699549.47
MW-41U	12038.26	10772.08	2534897.86	1699544.98
MW-42B	11567.56	9266.49	2534444.98	1698033.75
MW-43U	11746.29	10167.43	2534613.06	1698936.81
MW-44B	8927.07	8280.64	2531816.57	1697015.97
MW-44T	8931.04	8280.46	2531820.55	1697015.84
MW-45B	8781.61	7663.47	2531678.40	1696397.06
MW-46B	10965.65	8350.34	2533853.97	1697110.35
MW-46T	10969.81	8348.48	2533858.15	1697108.54
MW-47B	11729.15	8848.23	2534611.47	1697617.46
MW-47T	11729.55	8843.82	2534611.92	1697613.06
MW-48B	11551.14	8269.53	2534440.30	1697036.63
MW-48T	11555.48	8269.54	2534444.65	1697036.70
MW-49B	14145.97	9063.03	2537025.32	1697861.52
MW-50B	14805.27	9444.36	2537680.02	1698250.81
MW-50T	14800.57	9445.54	2537675.30	1698251.93
MW-51B	13555.49	10440.59	2536418.72	1699231.86
MW-51T	13552.35	10440.33	2536415.58	1699231.57
N001	13052.66	9773.09	2535923.84	1698558.31
N002	13055.79	9771.52	2535926.99	1698556.78
N003	12371.41	8898.96	2535253.01	1697675.97
N004	12405.94	8648.15	2535290.49	1697425.58
N005	11961.99	8916.48	2534843.46	1697688.53
N006	12467.14	8992.46	2535347.62	1697770.62
N-1	11961.31	9841.01	2534831.88	1698613.01
N-2	11938.25	9494.98	2534812.91	1698266.72
N-3	12499.52	9764.25	2535370.91	1698542.77
ND-1	11937.40	10556.95	2534799.55	1699328.63
ND-2	12194.61	10384.65	2535058.74	1699159.45
ND-3	12439.35	10240.65	2535305.13	1699018.42
ND-4	12683.61	10076.14	2535551.29	1698856.87
ND-5	12959.19	9902.78	2535828.86	1698686.86
P-1	13140.99	9895.04	2536010.72	1698681.32
P-2	13247.14	9859.65	2536117.26	1698647.21
P-3	13211.04	9791.20	2536081.98	1698578.34
P-4	13132.47	9848.04	2536002.76	1698634.22
PS-01	10060.95	9288.93	2532938.37	1698037.95
PS-02	10036.92	9998.83	2532905.98	1698747.53
PS-02(S)	10029.65	9953.80	2532899.24	1698702.41
PS-03	11333.49	10635.12	2534194.83	1699399.49
PS-04	11581.52	10663.90	2534442.47	1699431.27

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Location ID	Local Coordinate System[1]		State-Plane Coordinate System[2]	
	Easting	Northing	Easting	Northing
PS-05	11959.62	10251.17	2534825.37	1699023.14
PS-05R	11960.66	10248.40	2534826.44	1699020.37
PS-06	12318.22	10216.96	2535184.30	1698993.27
PS-07	12292.08	10048.11	2535160.16	1698824.11
PS-08	12866.56	9844.79	2535736.94	1698627.75
PS-09	11541.87	9856.25	2534412.34	1698623.17
PS-10	12275.55	9068.80	2535155.17	1697844.64
PS-11	9167.05	8990.67	2532048.14	1697728.88
PS-12	11693.79	11094.98	2534549.64	1699863.69
PS-13	11905.19	11109.40	2534760.83	1699880.67
PS-14	11874.68	10917.85	2534732.58	1699688.76
PS-15	11686.84	10715.31	2534547.17	1699483.95
PS-16	12412.94	10350.22	2535277.43	1699127.66
PS-17	12354.36	9341.23	2535230.75	1698118.01
PZ-01(I)	11791.14	9778.52	2534662.49	1698548.46
PZ-01(I)R	11821.29	9805.78	2534692.31	1698576.09
PZ-01(S)	11784.32	9770.57	2534655.76	1698540.43
PZ-01(S)R	11818.50	9802.68	2534689.56	1698572.96
PZ-02(I)	12514.84	9948.68	2535384.05	1698727.38
PZ-02(S)	12523.55	9947.17	2535392.78	1698725.97
PZ-03(I)	13000.23	9555.85	2535873.98	1698340.44
PZ-03(S)	13005.92	9551.41	2535879.72	1698336.07
PZ-04(I)	11554.73	9338.59	2534431.30	1698105.69
PZ-04(I)R	11563.09	9328.59	2534439.78	1698095.79
PZ-04(S)	11566.15	9334.94	2534442.76	1698102.17
PZ-04(S)R	11568.40	9326.02	2534445.11	1698093.29
PZ-05(S)	12617.66	10261.45	2535483.16	1699041.38
PZ-06(S)	12700.35	10127.47	2535567.42	1698908.41
PZ-4P	11566.15	9334.93	2534442.76	1698102.17
S-100-OA	11667.73	10613.54	2534529.26	1699381.95
S-120-IONA	11685.97	10602.60	2534547.62	1699371.23
S-150-20NA	11722.14	10603.87	2534583.77	1699372.94
S-150-5SA	11702.07	10571.51	2534564.09	1699340.34
S-150-5SB	11711.19	10587.46	2534573.02	1699356.40
S-250-15NA	11806.52	10547.82	2534668.80	1699317.91
S-300-OA	11853.70	10526.25	2534716.22	1699296.92
S-300-OB	11842.75	10509.84	2534705.47	1699280.38
S-450-OB	11975.02	10430.55	2534838.65	1699202.69
S-50-OB	11624.40	10638.60	2534485.64	1699406.49
SB-1	9168.04	9008.08	2532048.93	1697746.29
SB-2	12362.55	9370.93	2535238.60	1698147.81
SB-3	10120.14	9142.15	2532999.27	1697891.89
SB-4	11367.99	9688.11	2534240.48	1698452.94
SB-5	10435.76	10611.62	2533297.53	1699365.12
SB-6	10350.49	10317.47	2533215.74	1699069.94
SB-7	11643.41	10065.85	2534511.39	1698833.99
SB-8	12462.66	10083.13	2535330.30	1698861.19

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	Easting	Northing	Easting	Northing
SB-9	10855.98	9208.80	2533734.20	1697967.45
SB-10	11205.26	9247.43	2534082.96	1698010.31
SB-11	11778.06	9309.77	2534654.93	1698079.58
SB-12	11781.25	9436.15	2534656.63	1698205.99
SB-13	11955.98	9598.35	2534829.41	1698370.30
SB-14	12269.37	9670.88	2535141.90	1698446.62
SB-15	12337.90	9836.63	2535208.46	1698613.19
SB-16	12570.50	9715.22	2535442.45	1698494.60
SB-17	12826.21	9665.18	2535698.70	1698447.66
SB-18	12886.70	9508.34	2535761.04	1698291.56
SB-19	12297.03	9228.72	2535174.76	1698004.81
SB-20	13024.90	9350.77	2535901.06	1698135.67
SB-21	13350.59	9432.69	2536225.73	1698221.53
SB-22	13335.30	8947.75	2536216.16	1697736.42
SB-23	11974.69	9011.53	2534855.04	1697783.72
SB-24	12572.61	8946.00	2535453.62	1697725.44
SB-25	12790.33	9064.53	2535669.91	1697846.60
SB-26	12987.25	9061.11	2535866.83	1697845.57
SB-27	12270.16	8434.22	2535157.26	1697210.02
SB-28	12034.17	10776.62	2534893.71	1699549.47
SB-29	12186.34	10828.11	2535045.25	1699602.79
SB-30	11811.09	10715.25	2534671.39	1699485.39
SB-31	12133.85	10593.69	2534995.53	1699367.75
SB-32	12400.45	10422.73	2535264.10	1699200.03
SB-33	10909.44	10960.50	2533767.02	1699719.72
SB-34	12088.08	11166.27	2534943.02	1699939.75
SB-35	12613.25	10942.44	2535470.74	1699722.29
SB-36	12941.55	10244.45	2535807.20	1699028.30
SB-37	13048.54	8971.32	2535929.17	1697756.52
SB-38	11894.50	9293.71	2534771.54	1698064.92
SB-39	12230.64	10205.60	2535096.87	1698980.84
SB-40	12527.25	9447.88	2535402.36	1698226.75
SB-41	12376.27	9157.19	2535254.83	1697934.25
SB-42	13197.62	9798.46	2536068.48	1698585.44
SB-45	11567.56	9266.49	2534444.98	1698033.75
SB-46	11746.29	10167.43	2534613.06	1698936.81
SHELBY-1	12261.29	10136.08	2535128.34	1698911.70
SHELBY-2	11575.49	10590.05	2534437.31	1699357.35
SHELBY-3	11347.04	10817.35	2534206.22	1699581.87
SHELBY-4	10198.41	9235.41	2533076.44	1697986.09
SL-A	12300.00	9997.00	2535168.68	1698773.10
SL-B	12170.00	10001.00	2535038.66	1698775.52
SL-C	11219.00	9977.00	2534088.11	1698740.01
SL-D-1	10594.00	9623.00	2533467.39	1698378.46
SL-D-2	10517.00	9570.00	2533391.03	1698324.53
SL-E	9878.00	10526.00	2532740.88	1699272.75
SL-G	8965.00	9525.00	2531839.83	1698260.74

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Location ID	Local Coordinate System[1]		State-Plane Coordinate System[2]	
	Easting	Northing	Easting	Northing
SP-01	8435.20	7529.50	2531333.64	1696258.91
SP-02	8898.10	7539.00	2531796.34	1696274.01
SP-03	9427.70	7629.70	2532324.78	1696371.12
SP-04	9863.00	7804.50	2532757.94	1696551.18
SP-05	10051.20	7795.90	2532946.21	1696544.86
SP-06	10447.40	7933.60	2533340.72	1696687.35
SP-07	10767.60	7936.50	2533660.83	1696694.13
SP-08	11238.20	8116.20	2534129.22	1696879.52
SP-09	11360.30	8172.00	2534250.65	1696936.80
SP-10	11744.80	8189.50	2534634.87	1696958.95
SPond-1	12235.01	8660.89	2535119.44	1697436.25
SPond-2	12311.11	8661.99	2535195.52	1697438.28
SS-01	8847.00	9319.00	2531724.28	1698053.32
SS-02	8918.00	9107.00	2531797.77	1697842.19
SS-03	9012.00	9513.00	2531886.97	1698249.31
SS-04	9045.00	9130.00	2531924.47	1697866.72
SS-05	9204.00	9254.00	2532081.98	1697992.64
SS-06	9260.00	9450.00	2532135.66	1698189.31
SS-07	9457.00	9613.00	2532330.71	1698354.69
SS-08	9445.00	9315.00	2532322.22	1698056.56
SS-09	9856.00	9283.00	2532733.53	1698029.54
SS-10	10403.00	9942.00	2533272.66	1698695.13
SS-11A	10592.00	9621.00	2533465.41	1698376.43
SS-12	10406.00	9315.00	2533283.05	1698068.19
SS-13	11056.00	9463.00	2533931.19	1698224.06
SS-14	11286.00	9456.00	2534161.23	1698219.84
SS-15	11177.00	9813.00	2534048.05	1698575.51
SS-16	11862.00	11046.00	2534718.40	1699816.75
SS-17A	11962.00	10932.00	2534819.72	1699703.96
SS-18	12044.00	10959.00	2534901.39	1699731.95
SS-19	11728.00	10869.00	2534586.51	1699638.13
SS-20	11785.00	10918.00	2534642.92	1699687.82
SS-21	11892.00	10902.00	2534750.09	1699673.12
SS-22	11669.00	10870.00	2534527.51	1699638.42
SS-23	12142.00	10906.00	2535000.00	1699680.14
SS-24	12101.00	10874.00	2534959.38	1699647.65
SS-25	12197.00	10682.00	2535057.63	1699456.82
SS-26	11715.00	10788.00	2534574.46	1699556.98
SS-27A	12144.00	10636.00	2535005.18	1699410.18
SS-28	12305.00	10700.00	2535165.40	1699476.13
SS-29	12096.00	10558.00	2534958.11	1699331.60
SS-30A	12361.00	10408.00	2535224.83	1699184.82
SS-31	12386.00	10313.00	2535250.94	1699090.12
SS-32	12485.00	10306.00	2535350.01	1699084.32
SS-33	11974.00	10491.00	2534836.92	1699263.13
SS-34	12333.00	10254.00	2535198.65	1699030.48
SS-36	12892.00	9876.00	2535762.00	1698659.27

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Location ID	Local Coordinate System[1]		State-Plane Coordinate System[2]	
	Easting	Northing	Easting	Northing
SS-37	11326.00	10604.00	2534187.70	1699368.28
SS-38	11700.00	10381.00	2534564.26	1699149.81
SS-39	11892.00	10040.00	2534760.25	1698811.15
SS-40	11992.00	10045.00	2534860.17	1698817.36
SS-41	12030.00	9962.00	2534899.14	1698734.83
SS-42	12300.00	9997.00	2535168.68	1698773.10
SS-43	12463.00	9909.00	2535332.69	1698687.07
SS-44	12697.00	9798.00	2535567.95	1698578.91
SS-45	12089.00	9837.00	2534959.60	1698610.55
SS-46	11827.00	9461.00	2534702.08	1698231.39
SS-47	12367.00	9468.00	2535241.90	1698244.93
SS-48	12724.00	9536.00	2535598.03	1698317.25
SS-49	13246.00	9691.00	2536118.12	1698478.56
SS-50A	13164.00	9572.00	2536037.53	1698358.57
SS-51A	13075.00	9527.00	2535949.08	1698312.50
SS-53	12373.00	9421.00	2535248.45	1698198.00
SS-55	12391.00	9396.00	2535266.74	1698173.22
SS-56	12502.00	9275.00	2535379.15	1698053.57
SS-57	12200.00	9024.00	2535080.16	1697798.93
SS-58	12358.00	9015.00	2535238.24	1697791.84
SS-59	12100.00	8999.00	2534980.47	1697772.72
TA-1	11392.00	9930.00	2534261.63	1698695.10
TA-2	11333.00	9927.00	2534202.68	1698691.39
TA-3	11345.00	9939.00	2534214.53	1698703.54
TP-1	12400.89	9419.10	2535276.36	1698196.44
TP-2	12604.61	9456.95	2535479.60	1698236.76
TP-3	12797.20	9512.36	2535671.50	1698294.50
TP-4	12835.02	9533.99	2535709.06	1698316.58
TP-5	12887.10	9565.41	2535760.76	1698348.63
TP-6	12995.94	9566.95	2535869.56	1698351.49
TP-7	12384.49	9416.54	2535259.99	1698193.68
TP-8	12377.80	9415.57	2535253.31	1698192.63
TP-9	12364.84	9413.81	2535240.38	1698190.72
TP-10	12350.81	9408.50	2535226.41	1698185.24
TP-11	12332.63	9395.69	2535208.39	1698172.21
TP-12	12320.52	9387.02	2535196.38	1698163.39
TP-13	12299.97	9373.08	2535176.00	1698149.20
TP-14	12112.87	9336.12	2534989.37	1698109.98
TP-15	12104.62	9334.20	2534981.14	1698107.96
TP-16	11983.99	9325.19	2534860.64	1698097.49
TP-17	11943.63	9311.83	2534820.44	1698083.64
TP-18	11921.43	9303.56	2534798.35	1698075.10
TP-19	12059.13	9331.14	2534935.70	1698104.35
TP-20	12718.21	9475.55	2535592.96	1698256.73
TP-21	12752.55	9486.61	2535627.16	1698268.21
TP-22	12572.78	9324.47	2535449.33	1698103.90
TP-23	12539.84	9320.49	2535416.45	1698099.52

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Location ID	Local Coordinate System[1]		State-Plane Coordinate System[2]	
	Easting	Northing	Easting	Northing
TP-24	12506.55	9316.47	2535383.21	1698095.10
TP-25	12473.27	9312.45	2535349.98	1698090.67
TP-26	12395.50	9303.23	2535272.34	1698080.51
TP-100	8880.92	8951.58	2531762.52	1697686.32
TP-101	8836.90	9360.32	2531713.70	1698094.51
TP-102	8819.14	9826.34	2531690.45	1698560.30
TP-103	10119.64	9093.40	2532999.35	1697843.14
TP-104	10035.09	9081.07	2532914.96	1697829.78
TP-105	10399.79	9136.92	2533278.94	1697890.05
TP-106	10758.78	9165.48	2533637.52	1697922.95
TP-107	11402.91	9240.32	2534280.66	1698005.59
TP-108	11969.18	9315.54	2534845.95	1698087.66
TP-109	12001.03	9332.43	2534877.59	1698104.93
TP-110	12355.00	9320.85	2535231.63	1698097.64
TP-111	12406.25	9366.26	2535282.34	1698143.67
TP-112	10919.71	9188.59	2533798.16	1697948.01
TP-113	12110.12	9221.88	2534987.96	1697995.71
TP-114	12036.28	9214.76	2534914.22	1697987.70
TP-115	8076.81	8752.53	2530960.91	1697477.55
TP-116	7859.44	8727.36	2530743.86	1697449.75
TP-117	7596.48	8697.02	2530481.31	1697416.22
TP-118	8540.61	8802.40	2531424.04	1697533.03
TP-119	8398.68	8785.38	2531282.32	1697514.30
TP-120	12927.73	8949.38	2535808.64	1697733.12
TP-121	12814.03	9055.93	2535693.70	1697838.29
TP-122	12541.04	8958.00	2535421.92	1697737.06
TP-123	12344.77	9118.63	2535223.79	1697895.30
TP-124	12094.64	8999.12	2534975.11	1697772.78
TP-125	11821.57	8999.64	2534702.08	1697769.98
TP-126	13391.94	9022.41	2536271.90	1697811.77
TP-127	13250.03	8951.87	2536130.85	1697739.51
TP-128	13086.85	9115.97	2535965.77	1697901.63
TW-1U	12118.97	9346.86	2534995.34	1698120.79
TW-2U	12129.03	9276.12	2535006.23	1698050.18
TW-3U	12122.81	9228.87	2535000.57	1698002.86
TW-4U	12148.93	9125.58	2535027.90	1697899.88
TW-5U	12544.14	9393.17	2535419.89	1698172.25
TW-6U	12552.66	9326.63	2535429.19	1698105.82
TW-7U	12554.10	9314.71	2535430.77	1698093.91
TW-8U	12584.56	9163.93	2535463.01	1697943.51
W-01(S)	9843.07	10750.94	2532703.30	1699497.26
W-02(D)	12089.57	11158.27	2534944.61	1699931.77
W-02(S)	12096.68	11166.54	2534951.62	1699940.13
W-03(S)	12620.53	10942.33	2535478.02	1699722.26
W-04(S)	12920.11	10239.83	2535785.82	1699023.42
W-05(S)	8894.28	9008.75	2531775.21	1697743.66
W-06(S)	11707.62	10432.69	2534571.27	1699201.59

Coordinate Conversions for OU-3 Soil Borings and Monitoring Wells
DePue Site
DePue, Illinois

Location ID	Local Coordinate System[1]		State-Plane Coordinate System[2]	
	Easting	Northing	Easting	Northing
W-07(S)	11951.82	9957.19	2534821.03	1698729.07
W-08(S)	12120.57	9665.35	2534993.19	1698439.28
W-09(S)	11749.57	9464.42	2534624.62	1698233.87
W-10(S)	12750.80	9624.13	2535623.79	1698405.70
W-11(I)	12265.44	9531.55	2535139.61	1698307.25
W-11(S)	12246.13	9522.94	2535120.40	1698298.41
W-12(D)	10916.26	10964.57	2533773.78	1699723.87
W-12(S)	10908.54	10972.10	2533765.98	1699731.30
W-12(S)R	10908.78	10968.34	2533766.26	1699727.55
W-13(D)	11407.20	10451.55	2534270.68	1699216.82
W-13(S)	11412.26	10460.34	2534275.63	1699225.67
W-14(S)	9490.69	10043.16	2532359.33	1698785.24
W-15(S)	10786.76	9933.58	2533656.45	1698691.35
W-16(S)	10573.89	9186.52	2533452.42	1697941.75
W-17(D)	11051.85	9222.35	2533929.88	1697983.36
W-17(S)	11042.00	9221.50	2533920.04	1697982.40
W-18(D)	11968.94	9005.10	2534849.36	1697777.23
W-18(S)	11959.67	9004.56	2534840.10	1697776.58
W-19(D)	13034.44	8979.89	2535914.97	1697764.92
W-19(S)	13024.81	8978.75	2535905.36	1697763.67
W-20(I)	12243.43	10530.09	2535105.84	1699305.48
W-21(D)	11555.69	9861.18	2534426.11	1698628.27
W-22(S)	13209.15	9839.24	2536079.52	1698626.35
WP1	12809.82	8912.41	2535691.18	1697694.73
WP2	12961.05	8902.78	2535842.50	1697686.92
WP3	13150.72	8843.50	2536032.83	1697629.94
WP4	13259.46	8847.93	2536141.50	1697635.69
WP5	13389.18	8892.65	2536270.68	1697681.98
Z-01	10984.61	10669.51	2533845.60	1699429.66
Z-02	11306.92	10545.23	2534169.32	1699309.28
Z-03	11391.07	10313.92	2534256.18	1699079.00
Z-04	10993.77	10777.29	2533853.49	1699537.54
Z-05	11466.37	10259.21	2534332.11	1699025.21
Z-06	11322.18	10222.89	2534188.38	1698987.14
Z-07	11582.01	9995.03	2534450.84	1698762.43
Z-08	11494.91	9967.62	2534364.08	1698733.97
Z-09	11715.37	10582.71	2534577.25	1699351.70
Z-10	11135.24	10407.52	2533999.29	1699169.49
Z-11	11463.51	10499.62	2534326.41	1699265.57
Z-12	10986.49	10701.80	2533847.10	1699461.97

Notes:

[1] = Site Specific Coordinate System

[2] = State Plane Coordinate System, 1983, Illinois West

ATTACHMENT 5

ATTACHMENT 5

Attachment 5

Table C1-8 – Phase I RI Data Report

TABLE C1-8
Soil Analytical Data - Geochemical Parameters (Validated)

Sample location	SampleID	QC Type	Depth (ft bgs)	Sulfur Pyritic %	Sulfur Residual %	Sulfur Sulfate %	Sulfur, Total %	pH, Saturated Paste Units	Specific Conductance umhos/cm	Total Carbon %	Total Inorganic Carbon %	Total Organic Carbon %	Neutralization Potential CaCO3 %	Acid Neutralization Potential (calc), t CaCO3/Kt	Acid Generation Potential (calc) t CaCO3/Kt	Acid-Base Potential (calc) t CaCO3/Kt
A-1	990459		0 - 0.5				0.01 J									
A-1	990463		7.5 - 10				0.3 J									
A-1	990465		12.5 - 15				0.06 J		143	2.94	2.53	0.41				
A-2	990302		0 - 0.5				0.03 J									
A-2	990303	DUP 990302	0 - 0.5				0.02 J									
A-2	990307		7.5 - 10				0.01 J		0.313 J	2.37 J	2.25 J	0.12 J				
A-2	990310		15 - 17.5				0.01 J									
A-2	990312		20 - 22.5				0.01 J									
A-3	990370		0 - 0.5				0.02 J									
A-3	990374		7.5 - 10				0.01 J		45	0.3 J	0.1 J	0.2 J				
A-3	990375		10 - 12.5				0.01 J									
A-3	990378		17.5 - 20				0.02 J									
A-4	990380		0 - 0.5				0.01 J									
A-4	990381	DUP 990380	0 - 0.5				0.02 J									
A-4	990383		2.5 - 5				0.01 J									
A-4	990384		5 - 7.5				0.02 J									
A-4	990387		12.5 - 15				0.03 J									
A-4	990388		15 - 17.5				0.03 J		266	1.29 J	1.08 J	0.21 J				
A-5	990451		0 - 0.5				0.03 J									
A-5	990452		0.5 - 2.5				0.01 J									
A-5	990453		2.5 - 5				0.01 J									
A-5	990456		10 - 12.5				0.01 J		126 J	2.64	2.56	0.08 B				
B-1	990467		0 - 0.5				0.04 J									
B-1	990471		7.5 - 10				0.01 J		130	3.4	3.29	0.11				
B-1	990472	DUP 990471	7.5 - 10				0.01 J		126	3.4	3.3	0.1 B				
B-1	990475		15 - 17.5				0.01 J									
B-1	990478		22.5 - 25				0.01 J									
B-1	990480		27.5 - 30				0.01 J									
B-2	990493		0 - 0.5				0.04 J									
B-2	990494		0.5 - 2.5				0.02 J									
B-2	990497		7.5 - 10				0.05 J									

Location-
Sample Material

TABLE C1-8
Soil Analytical Data - Geochemical Parameters (Validated)

Sample location	SampleID	QC Type	Depth (ft bgs)	Sulfur Pyritic %	Sulfur Residual %	Sulfur Sulfate %	Sulfur, Total %	pH, Saturated Paste Units	Specific Conductance umhos/cm	Total Carbon %	Total Inorganic Carbon %	Total Organic Carbon %	Neutralization Potential CaCO3 %	Acid Neutralization Potential (calc), t CaCO3/Kt	Acid Generation Potential (calc) t CaCO3/Kt	Acid-Base Potential (calc) t CaCO3/Kt	Location-Sample Material
B-2	990500		15 - 17.5				0.02 J										
B-2	990550		17.5 - 20	0.01 U	0.01 U	0.01 U	0.01 U		1.07	0.91	0.71	0.2	5.9	60	1 U	60	LPRA-A
B-3	990861		0 - 0.5				0.06 J										
B-3	990864		5 - 7.5	0.01 B	0.03 B	0.14	0.18		2.34 J	1.84	1.1	0.74	10.4	104	6	98	LPRA-F
B-3	990866		12-Oct	0.01 U	0.01 B	0.15	0.16		4.04 J	1.13	0.43	0.7	4.8	48	5	43	LPRA-F
B-3	990867		12.5 - 15				0.19 J										
B-3	990868	DUP 990867	12.5 - 15				0.2 J										
B-3	990869		15 - 17.5				0.04 J										
B-4	990982		0 - 0.5				0.01 J										
B-4	990985		5 - 7.5				3.07 J										
B-4	990986		7.8 - 12.5				0.23 J										
B-4	990987	DUP 990986	7.8 - 12.5				0.25 J										
B-5	990886		0 - 0.5				0.09 J										
B-5	990889		5 - 7.5				6.64 J										
B-5	990892		13 - 15				0.57 J										
B-5	990893		15 - 16.5				0.31 J										
B-5	990894		16.5 - 20	0.01 U	0.03 B	0.43	0.46		931	2.16	0.02 U	2.27	0.7	7	14	-7	LPRA-A
B-6	990413		0 - 0.5				0.08 J										
B-6	990414		0.5 - 1.5				0.06 J										
B-6	990415		1.5 - 2.5				0.01 J										
B-6	990418		7.5 - 10				0.01 J		142	0.66 J	0.46 J	0.2 J					
B-6	990419		10 - 12.5				0.02 J										
C-1	990293		0 - 0.5				0.01 J										
C-1	990294	DUP 990293	0 - 0.5				0.01 J										
C-1	990296		2.5 - 4				0.02 J										
C-1	990297		4 - 7.5				0.02 J										
C-1	990299		10 - 12.5				0.01 J		0.917 J	1.56 J	1.44 J	0.12 J					
C-1	990300		12.5 - 15				0.01 J										
C-2	990247		0 - 0.5				0.01 B										
C-2	990251		7.5 - 10				0.01 B										
C-2	990254		15 - 17.5				0.02 B		135	2.16 J	1.93 J	0.23 J					

TABLE C1-8. Soils Analytical Data - Geochemical Parameters (Validated)

TABLE C1-8
Soil Analytical Data - Geochemical Parameters (Validated)

Sample location	SampleID	QC Type	Depth (ft bgs)	Sulfur Pyritic %	Sulfur Residual %	Sulfur Sulfate %	Sulfur, Total %	pH, Saturated Paste Units	Specific Conductance umhos/cm	Total Carbon %	Total Inorganic Carbon %	Total Organic Carbon %	Neutralization Potential CaCO3 %	Acid Neutralization Potential (calc), t CaCO3/Kt	Acid Generation Potential (calc) t CaCO3/Kt	Acid-Base Potential (calc) t CaCO3/Kt	Location-Sample Material
C-2	990257		22.5 - 25				0.02 B										
C-2	990258		25 - 27.5				0.01 B										
C-3	990637		0 - 0.5				0.24										
C-3	990639		2.5 - 5				0.03 B										
C-3	990641		7.5 - 10	0.09 J	0.3 J	0.14 J	0.53 J		4.14 J	2.36	1.04	1.32	8.7 J	87 J	17 J	70 J	LPRA-L
C-3	990642		10 - 16.5				0.42										
C-3	990643		17.5 - 20				0.01 U										
C-4	990652		0 - 0.5				1.13										
C-4	990655		5 - 7.5	0.01 U	0.5	0.18	0.68		692	2.52	0.8	1.72	7	70	21	49	LPRA-L
C-4	990658		12.5 - 15				0.58										
C-4	990659		15 - 17.5				0.12										
C-4	990660	DUP 990659	15 - 17.5				0.11										
C-4	990662		20 - 22.5				0.08 B										
C-5	990664		0 - 0.5				0.51										
C-5	990667		5 - 7.5				0.79										
C-5	990669		10 - 14.5	0.02 J	0.5 J	0.46 J	0.98 J		3.87 J	3.54	0.02 U	3.91	4.5 J	45 J	42 J	3 J	LPRA-L
C-5	990670		14.5 - 17.5				0.13										
D-2	990316		0 - 0.5				0.8 J										
D-2	990319		5 - 7.5				0.13 J										
D-2	990320		7.5 - 10				0.01 J										
D-2	990322		12.5 - 15				0.01 J										
D-3	990350		0 - 0.5				0.23 J										
D-3	990351	DUP 990350	0 - 0.5				0.23 J										
D-3	990354		5 - 6.5	0.24	0.23	0.1 U	0.46		106	1.35 J	0.16 J	1.19 J	1	10	14	-4	EA-F
D-3	990355		6.5 - 7.5				0.01 J										
D-3	990357		10 - 12.5				0.04 J										
D-4	990218		0 - 0.5				0.03 B										
D-4	990219	DUP 990218	0 - 0.5				0.04 B										
D-4	990222		5 - 7.5				0.27										
D-4	990223		7.5 - 9				0.33										
D-4	990227		15 - 17.5				0.08 B										